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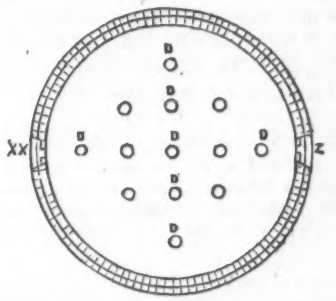
Metallurgy of Native Sulphur in Sicily and Spain.

To the Editor: I now forward you the second letter, in connection with the above subject, and add thereto the plans and sections of a calcarone furnace, such as are at present used in Sicily and Spain. The process is simple in theory, but requires a great deal of practical experience in its manipulation.

The dimensions of a calcarone differ much, according to the percentage of the ores; that is, the poorer the ore, the larger must be the furnace. When I commenced to use them in Spain, I found that furnaces about fifteen feet in diameter were the most successfully managed by workmen not versed in the process; but I found, also, that for economy, and a greater production in the smelting, a larger diameter, say 33 feet, gave the best results, and this is the size of the furnace in the accompanying plan.

The height at X, on the front or tapping door, varies from 6 to 8, and even 12 feet (though seldom the latter), and that at L, the aperture for loading, is about 4 feet. At X X also, in the ground and vertical plan, an aperture reaching from the bottom to the top of the furnace exists. This is also used for loading; but after that operation has been concluded, the aperture is closed with a cast of plaster of Paris (or pieces put together), the thickness being only two inches. This thin door is built up new every time, and destroyed for discharging. It is used as a pyrometer, the heat easily piercing it, and indicates to the smelter how far the sulphur has *sweated* down. In reality, this cannot be called a *smelting* operation, as no slag is formed, the heat being only sufficient to make the sulphur perspire out of the stone, leaving it in a spongy state. The ore is placed in large boulders, just as it comes out of the mines, from the middle to the bottom of the furnace, which has a declivity of about 15 to 20 degrees, such being necessary at the end of the operation, in order that the last remnants of melted sulphur shall run towards the tapping door at point M. In loading the furnace, all the smaller-sized ore is reserved for filling the furnace near the top, where it is piled into the shape of a cone, as at F F F; and chimneys are left at points D D D, about 2 feet deep. These are filled with brushwood, and in this way the ore is made to ignite. These hollows are left while piling the ore, and building the cone. The object of placing the small ore at the top, is simply to prevent any of the earth and sifted stone from falling through the large crevices that would be left, if large boulders were placed at the top. The earth and sifted stone or gravel play an important part in the manipulation. At K K K K we have, immediately in contact with the small ore, a stratum of about 6 inches of small sifted gravel, about the size of a nut, and on this again, at N N N N, we have a coating of earth; this is to make the interior of the furnace as impermeable as possible to the oxidizing action of the air, and this coating is increased or decreased, according to the amount of heat required, which in turn depends on the strength of the winds, and their direction. The brushwood ignited, the ore commences to burn, and the chimneys are kept open for about 20 hours, at the end of which period the ore has ignited all over the surface of the furnace, and to the depth of, say some 15 or 20 inches. The chimneys are then all closed as follows: bricks are placed over them, as at point P; and should the burning of the ore be too rapid, earth is then thrown over the bricks; but these chimneys are opened towards the middle of the operation, to increase the heat, and closed again, according to circumstances, to decrease it. After forty-eight hours, the melted sulphur begins to trickle down through the interstices of the stone, and congeals, forming as it were a conglomerate with the ore; the heat also travels downwards, and so we have remelting and congealing consecutively, till the sulphur arrives at the bottom of the furnace—forming a massive conglomerate of sulphur and ore; for it fills the interstices up to the point where the first tap-hole is drilled, through the thin door of plaster at point Z. The lines across the furnace denote the lines or levels of tapping; and this commences naturally at Z, and so downwards, as the congealed sulphur is remelted with the descending heat. Every twenty-four hours a fresh tapping takes place, the former holes are plastered up, and a new hole drilled lower down, and so on till we get down to the lowest point or bottom of the furnace. At the end of the operation, that is, during the last three days, nearly all the chimneys are left open, so that the air shall descend to the lower part of the furnace, and aid the combustion of the ore. The jet of sulphur is received into wooden moulds, as at point B. These have been soaked in water, to prevent the sulphur sticking to the wood, and are shaped wheel-barrow fashion, in order that the block of sulphur may easily fall out, without breaking. During the carrying away of a mould that has been filled, and the bringing of an empty one to be filled, the jet runs into a reservoir made for the purpose at A. One of the principal reasons for placing large blocks of ore, from the middle of the furnace downwards, is to leave sufficient interstices for receiving the sulphur, otherwise the first tap-hole would be too high, and near the ignited ore, thus setting fire to the stream of sulphur.

Two of the principal things to be guarded against, are overheating the furnace, and, on the other hand, carrying on the process so slowly by the complete closing of the chimneys, that the operation would take two months instead of four weeks from the commencement. In the former case, instead of the sulphur congealing between the interstices, it would all be in a melted state from the top tap-hole to the bottom, thus not only consuming an unnecessary amount of sulphur in keeping up the heat of the furnace, but likewise giving, by overheating, a bad chocolate brown color to the sulphur. This quality would hardly be saleable, even for sulphuric acid. Any number of furnaces, say ten, after having been loaded, can be attended by two men, one in the daytime, the other at night. As soon as the operation is over, which takes about a month, both apertures are opened, to allow a current of air to pass through the furnace. Otherwise, it would not cool for a month; but by this precaution, a furnace can be discharged in a few days.



The new patent now being tried, is a large brick furnace of the same shape, hermetically closed, and arched over, and the sulphur is sweated out of the ore, by a constant jet of steam from a boiler.

Henry Sewell.

Salt Lake City, Utah, Nov., 1871.

Notes on Lead Smelting in Nevada and Utah.

by O. H. Hahn, M. E.

(Continued from page 20.)

The following will illustrate the manipulations carried on at the different works of Eureka, Nevada:

In the front rank are the works of the Eureka Consolidated Co., at the north end of the most thriving camp of Nevada. This Company have 5 furnaces of a capacity of 150 tons of ore per day. The motive power for 4 Sturtevant blowers No. 8, an 8x10 Blake's crusher, and a 6-inch pump, is furnished by a 40 h. p. engine, with two boilers, one being always in reserve, in case of repairs.

Furnace No. 1, having 5 tuyeres of 2½ inches nozzle, was built after the pattern of the Oreana furnaces, similar to a North-of-England slag-hearth. Its present dimensions are 2½x3 ft. in the hearth, and 2x4 ft. at the top, with a height of 12 ft. from the centre of the tuyeres to the feed hole. Capacity, 21 tons of ore.

Furnace No. 2, with 3 tuyeres of 3 inches nozzle, is of the same pattern and capacity.

Furnace No. 3 is six-sided, with 5 tuyeres of 2½ inches nozzle, and otherwise of the same dimensions as the last, except as to height, which is 10 ft. Capacity, 23 tons. These 3 furnaces derive their blast from 2 blowers.

Furnaces No. 4 and 5 are octagonal, and have 10 tuyeres each, 4 on each side, adjoining the breast and 2 at the back. Each furnace has a blower of its own. Dimensions: 3x4½ ft. in the hearth, 6½ ft. at the top, 10 ft. high. Capacity from 35 to 40 tons per day. The blowers are run at a speed of 2,100 revolutions per minute, and yield air of a pressure

of 1 inch mercury. The cooling water passes from the tank through a 3-inch supply pipe, and thence through ¾ inch pipes, entering the tuyeres from below. The waste water passes out at the top of the tuyeres into funnels connected with a 3-in. waste-pipe. The latter leads to a large collecting tank outside of the building, whence the water, after cooling, is pumped back into the supply tank. Owing to the inadequacy of the supply-pipe, and the temporary insufficiency of water, only 4 furnaces can be run at a time. As the water is very muddy, the cast-iron tuyeres are very rapidly destroyed, on account of the accumulation of sediment inside. It is therefore contemplated to use only wrought-iron tuyeres, which, though costing nearly twice as much as cast-iron, last much longer.

The nozzles, connected by leather-hose (wind bags), with corresponding reducers in the main induction-pipe, are 4 inches diameter at the outer end, tapering down to 2¾ inches towards the mouth. They are pushed tightly into the tuyeres, to prevent the escape of wind. At the outer end or elbow a 1¼ inch projection is attached in the central axis of the nozzle. This contains the eye-hole, which is closed with a wooden plug. The latter is removed occasionally, to inspect the condition of the tuyere. To illustrate the manipulations at a furnace, we will follow them from the commencement, viz., from the blowing-in.

The hearth and furnace having been dried in the manner described above, the furnace is gradually filled up to the throat with coal, care being taken to keep it blazing. The fore-hearth and the apertures of the tuyeres are left open during this operation, to facilitate the draught. The filling up takes from 4 to 5 hours in a large furnace like Nos. 4 and 5. As soon as the coal at the throat has reached a dark red-heat, the blowing-in proper commences. Previous to putting on the blast, however, the front is put in; that is, the space *h* under the bridge *g* is closed up with bricks of stiff clay, rammed in tightly, and reaching a few inches below the dam-plate. Then, the fore-hearth is also covered with clay, pounded down tightly. All the tuyeres, with the exception of p, p 2, p 11 and p 12 are closed with clay stoppers; their respective wind bags are tied up with strings, to prevent the escape of wind. The nozzles of the 4 tuyeres named are now placed in position, and the blast is allowed to blow with full force for three quarters of an hour through the pipe of the syphon-tap. When the latter is red-hot, the blast is shut off by a cut-off in the main-pipe. The clay-balls are now removed from the closed tuyeres, and all the nozzles are put into the tuyeres. The blast is turned on again, and the charging commences. About 3 tons or more of lead are put into the furnace through the feed holes, in the proportion of 2 scoops (à 1.2 bushels) of coal to 250 or 300 lbs. of lead. This is done to heat the hearth properly, and prevent the accretion of slag or cinders, which might seriously interfere with the good working of the furnace. About 250 bushels of coal are used in all the foregoing proceedings. After all the lead is melted down, the feeding of the ore commences. First, six scoops à 1.2 bushels = 18 lbs. of coal, are scattered over the furnace, 3 from each feed hole; on the top of this, but close to the walls, 18 shovels of fine ore (à 15 lbs.), 9 through each feed hole, and 4 shovels à 17 lbs. of slag = 25 per cent. This makes 1 lb. of coal to 2.5 lbs. of ore, or 3.1 lbs. of smelting mixture.

Every charge is marked by moving a peg on a tally-board for the convenience of the superintendent.

As soon as the lead has entered the pipe of the syphon-tap below, which may be observed by the disappearance of the flame emanating from it up to that time, the basin is covered with live coal and kept so all the time. Simultaneously the clay is removed from the forehearth. About two hours after the first charge, the slag, entering from below the breast rises in the fore-hearth to the level of the slag-spout, viz: 3 in. below the dam-plate. A cast-iron pot of conical shape 26 inches deep, 15 inches upper, 6 inches lower diameter (in the clear), is now placed under the slag-spout by means of a truck, and the exit of the slag is urged by detaching the crust along the dam. For the first half hour the slag is somewhat stiff and only red-hot, from impurities and from the fact that the furnace has not attained the proper temperature. But in the course of time it increases in fluidity and incandescence. The corners of the forehearth have to be frequently cleared from hard accretions, to prevent them from growing. After the lapse of a few hours the blast is shut off and the front removed by means of a sledge and bar, in order to clear the hearth and tuyeres from adhering cinders. If there be a hard crust on top it has to be broken up and pushed out of the hearth. During the stoppage the tuyeres are closed up to protect the workmen from the escaping carbonic oxide-gas, and no new charge is introduced in the furnace. As soon as the hearth is clear, lump-coal to the amount of about 2 bushels is thrown over the fore-hearth, and a new front is made. The latter has to enter into the slag; if this is not observed, the blast will come through, not only subjecting the furnace-men to lead fumes, but at the same time chilling the fore-hearth. The front must be made of plastic clay; lean clay does not answer. After having closed the front, the nozzles are adjusted and the blast is turned on again. Hitherto the furnace has been running with a blaze at the top, indicating too high a temperature in its upper portions, which gives rise to great loss of lead by volatilization and also injures the feeder's health. If the slag is gaining in fluidity, and the tuyeres remain perfectly bright, not even showing the least black ring, 2 shovels of slag may be replaced by 2 shovels of ore, but this must be done with the utmost precaution and at intervals of from 4 to 6 hours. At last a point will be attained when the blaze at the top disappears and the throat gets perfectly dark, discharging only black smoke. The normal charge has now been reached. In 24 hours 180 charges of smelting mixture are run through with 1260 bshls. of coal. The normal charge for fine carbonate ore is 34 shovels of ore and 2 of slag, corresponding to 46 tons of ore in 24 hours; for coarse ore it is 26 shovels of ore and 2 of slag, corresponding to 35 tons pr. 24 hours. When the furnace has been in operation for a week it will even take more than this for a time, probably because it has then assumed the most favorable shape for smelting.

The furnace-men have to watch everything about the furnace very attentively, in order to be always ready to apply the proper remedies. The slag has to run almost constantly while the blast is on. As soon as it becomes smeary and sticky, and emits a spray of sparks, which rise in parabolic curves, the matte-spout is opened and the matte run into a cast-iron pot, lined with clay. It is of smaller dimensions than the slag-pot. Care must be taken to keep wet, or even cold tools away from matte, or metal, to avoid explosions. When the matte ceases, and in its stead slag begins to flow, the matte-spout is closed again with a clay-stopper. The matte-spout is 3 inches lower than the slag-spout and inclined a little towards the outside, while the latter lies horizontal. Thus it is possible to keep slag and matte separate. Meanwhile the syphon-tap requires some attention. The pipe must be kept clear from accretions by pressing a red-hot bar through it from time to time, because it is very difficult to open it again after it is once closed up. The basin is kept nearly full, and the lead is ladled out as it accumulates. The lead-moulds, which are in bar-shape, hold about 120 lbs. each. From every fifth bar a sample is taken by means of an iron spoon. The samples from all the furnaces obtained during a certain time, (usually 24 hours) are melted together to obtain the average sample.

The tuyeres must be kept clear by introducing a bar through the spout in the nozzle from time to time, to detach obstructions. If there should be any sign of darkening, the charge must be decreased by 2 shovels and the result waited for. If the charge be still too heavy, another decrease of 2 shovels is ordered until the tuyeres resume their normal condition. If they should at any time get long black nozzles, the blast must be stopped and the hearth cleared out immediately. The reason of their occurence may be an overcharge, or a preponderance of silica in the charge *i. e.* a faulty mixture. If under normal charges ore arrives raw before the tuyeres and the blaze bursts out at the top, an irregular sinking of the charges, or their detention on wall-accretions is indicated. These have to be removed. To do this the charge is allowed to descend half-way in the shaft of the furnace, and only wood is applied as a fuel. By its blaze the wall-accretions are partly melted down. The balance is removed with chisel-pointed bars, worked through the feedhole. During this operation the blast is of course shut off. Then the furnace is filled up again with coal, and the smelting proceeds as usual.

Under ordinary circumstances the hearth is cleaned once in 8 hours.

Polytechnic Association of the American Institute.

Meeting held Dec. 29, 1871. Prest. S. D. TILLMAN in the Chair.

The PRESIDENT read the following scientific notes:

I. APPARENT VOLATILIZATION OF SILICON AND BORON.—MM. Troots and Hautefeuille have presented a memoir to the French Academy of Sciences, containing an account of experiments made with pure silicon and boron, each by itself, placed in porcelain tubes, kept at a very high temperature (in a slow current of dry and pure hydrogen gas) and the reaction which ensues by the admission into the tube of fluoride of silicon, chloride of silicon and fluoride of boron. Silicon is, under these conditions, apparently volatilized, forming a brown colored smoke, which, in a cooler part of the tube, is condensed sometimes as amorphous silicon, sometimes in a crystalline state. The same occurs with boron; but the apparent volatilization is due to a simple mechanical effect, conjointly with the presence of compounds of silicon with chlorine and fluorine, which are only formed at a very high temperature and dissociated at a red heat.

The PRESIDENT—It has been supposed that silicon and boron could not be brought into a liquid or gaseous state. These experiments merely show that, under certain circumstances, an apparent volatilization takes place.

II. PREPARATION OF DEXTRINE.—O. Ficinus has described in "Dingler's Polytechnic Journal" a cheap mode of preparing pure dextrine. A mixture, consisting of 500 parts of potato-starch, 1,500 parts of cold distilled water and 8 parts of pure oxalic acid, is placed in a suitable vessel on a water bath and heated until a small sample tested with iodine solution does not produce the reaction of starch. When this is found to be the case the vessel is immediately removed from the water bath and the liquid neutralized with pure carbonate of lime. After having been left standing for a couple of days, the liquor is filtered and the clear filtrate evaporated upon a water bath until the mass becomes quite a paste, which is removed by a spatula, and, having been made into a thin cake, is placed upon paper and further dried in a warm place; 220 parts of pure dextrine are thus obtained.

Mr. STETSON—What becomes of the rest of it?

The PRESIDENT—It remains in the form of starch. Mr. Hirsch, one of our members, was manufacturing starch very largely at Chicago before the fire, but was burned out. He used principally corn, of which he could buy cargoes in a partially damaged condition, which answered every purpose for making starch. Oswego is another point where large quantities of starch are made, and which affords the same facility for procuring the materials at a low rate.

Wheat is not much used for starch. The principal substances are corn and potatoes.

III. ACTION OF HEAT ON GERM LIFE.—T. CRACE CALVERT, in a paper "On the Action of Heat on Protoplasmic Life dried on in Cotton Fabrics," published in the London *Chemical News*, relates a series of experiments which have a direct bearing on the question of the disinfection of fabrics and wearing apparel in heated stoves, with the object of destroying contagion or animalcule life. To carry out these views, a piece of ordinary grey calico was treated chemically and washed until free from any sizing material and dried. This prepared cloth was then steeped in a solution of putrid albumen containing abundance of animalcule life, wrung out and dried at the natural temperature; it was then cut into small pieces five centimetres square. Each of the pieces was rolled up and introduced into a strong glass tube which was hermetically sealed. Some of these were exposed to a temperature raised successively to 100, 200, 300, 400 500 and 600 degrees Fahrenheit. Other pieces were placed in pure distilled water, and another series of pieces were placed in tubes containing an albumen solution, each being successively subjected to temperatures varying from 100 to 600 degrees Fahrenheit. In all cases it was found that at 300 degrees Fahrenheit vibrios were present in small number, while in the water series *bacteria* were also detected. At 400 degrees Fahrenheit no evidence of life was found. In order to ascertain what changes the calico had undergone, one of each of the small tubes which had been heated to the different temperatures was broken and its contents carefully examined. The pieces heated to 200 degrees were quite sound, whilst those heated to 300 degrees were of a slightly brown color, much injured, and, for practical purposes, completely spoiled. At 400 degrees the cloth was very much charred. These results show that the temperature which will not destroy germ life is quite sufficient to materially injure cotton fabric; hence it is concluded that no beneficial results can be obtained by the employment of public stoves as a means of destroying germ life and contagion.

Dr. RICHARDS—Some experiments have been made in this city in relation to fumigating ships by steam, wherein it was presumed that that would be a perfect and an inexpensive mode of disinfecting them. It seems that it is not effective. There are certain disinfecting elements by which vegetables and many animalcules are destroyed at the temperature of boiling water. There are cryptogams which are readily destroyed by boiling water. A bunch of mouldy grapes may be made sweet, safe and pleasant to eat, by holding it for a moment in boiling water. I have heard housewives say that boiling clothes will not destroy nits, but that baking them will.

The PRESIDENT—A very small quantity of carbolic acid will destroy animal and vegetable life.

Mr. BLANCHARD—In Dr. Bastian's experiments on germ life, with a view to ascertain whether animal life could originate by spontaneous generation, he heated his elements to 212 degrees, which was supposed sufficient to destroy all germs of life. These experiments would seem to prove that Dr. Bastian's experiments were not conclusive.

The PRESIDENT—Dr. Bastian has been pursuing the line of experiments commenced by Crosse many years ago and continued by Pasteur and others. He takes the ground that life can be originated in matter; but in some of his later experiments, in which a higher temperature was applied to the solutions, the same results were not obtained.

V. A VALUABLE ALLOY.—Dr. E. Dingler has made an alloy resembling gold by mixing three metals in the following proportions: Copper, 58.86; zinc, 40.32; lead, 1.90. It is said to be malleable and durable, and is evidently prepared with little expense.

Dr. VAN DER WEYDE—On the face of it, I should not have much confidence in an alloy of brass with lead.

The PRESIDENT—There is less than two per cent. of lead.

Dr. RICHARDS—I do not like to hear an alloy judged in that way. We know that sometimes a small proportion of an inferior article will produce a more perfect result. An alloy sometimes has properties different from the metals of which it is composed. For instance, we can make an alloy fusible at a temperature lower than that at which either of the metals of which it is composed will melt.

VI. MEAT EXTRACTS AND BEEF TEA.—Dr. P. MULLER has given, in the *Moniteur Scientifique*, an account of his researches, and his conclusions are as follows: Meat extracts are neither directly nor indirectly food, for they do not contain albumenoid matter, neither do the nitrogenous principles which they contain arrest dis-assimulation—that is, they do not prevent the waste of the organic matter which composes the body. In small doses these extracts are useful by the stimulant action of the potassa salts, which promote digestion and circulation; in strong doses—too large at once—these substances may have a very injurious effect. When given to convalescents from serious diseases, especially if the system is exhausted by prolonged abstinence, the potassa salts present in these extracts in large quantity will act more injuriously, because the system has lost a great deal of chloride of sodium. Instead, then, of promoting digestion, these substances will interfere with it (1) by the direct action of the salts of potash on the blood globules, whereby the absorption of the oxygen by these globules is greatly decreased; (2) by the predominance of such salts in the serum of the blood which only physically dissolve carbonic acid, and do not allow the normal quantity of that gas to be exhaled, and thus impede the access of oxygen. Medical men should bear in mind that if given alone, these extracts, and likewise beef tea, are no nutriment, and only tend to keep the convalescent weak, being thus ill fed, or, rather, not fed at all. These conclusions are substantially those entertained by Liebig and many other investigators in the same field.

Dr. VAN DER WEYDE. — The extracts of meat, brought from Texas, do pretty well for making a hasty plate of soup; but have not the power of the meat. The excess of potash is injurious. We want sodium, and not potassium. For instance, we use the sulphate of sodium, or Glauber's salts, but give the sulphate of potassium to horses. The iodide of potassium produces eruptions, and the iodide of sodium does not. While it is even asserted that all the potash compounds are poisonous, we need the chloride of sodium, or common salt, in the system; and if we do not supply it, it is recomposed in the system.

The PRESIDENT.—Potash seems best for vegetable life, and sodium for animal life.

Dr. RICHARDS.—Potatoes, which are highly charged with potassium, are especially recommended to sailors for scurvy. Potash is a valuable medicine. In a recent experiment, a very small amount of potash injected into the veins, stopped the motion of the heart and killed the animal. An equal quantity of soda had no effect at all. Potash is used as a medicine, and so are arsenic and mercury, although they are deadly poisons.

COMPOUND PROPELLER PUMP.

Mr. SHAW, of Philadelphia, exhibited and explained a model of the compound propeller pump, exhibited at the Fair of the American Institute. It has first a revolving propeller blade, which lifts and rotates the water; then a stationary propeller blade, with the angle reversed, to counteract the rotatory tendency; then another revolving blade, a short distance above it, and a stationary blade immediately above that, and so on to the top of the tube. The maximum pressure produced by each pair of blades is three pounds to the square inch.

Mr. STETSON.—What is the gain in duplicating the blades all the way up, over putting them all at the bottom?

Mr. SHAW.—You can put them all at one end, or scatter them all along; it makes no difference. But you can only raise water six feet by one pair.

Dr. BRADLEY.—Will you explain why one pair will not lift it more than six feet?

Dr. VAN DER WEYDE—One turn of the blade of a screw propeller is as good as twenty. So, if you put twenty of these together, the last one will lift it six feet, and that is all. Some months ago I was invited to witness the experiments at the Novelty Works, and hold in my hand an invitation to make another investigation to-morrow. I found that a certain velocity of the propeller would not lift the water more than three feet; and that the velocity must be very great to raise it six feet. The great objection to this instrument is that it must be rotated at so great a velocity. And where there is a column of water one hundred feet high, the friction of the pivot below would be enormous. But here comes in the important invention of the water bearing. It does not stand upon a pivot, but is suspended by a disc, under which water is forced with sufficient pressure to support the weight, so that it is lifted from its bearings and is suspended on the water, and revolves with little friction. Observing that the water discharged from this bearing was raised in temperature by the friction, I measured the amount of water, and its elevation of temperature, and found that the loss by friction, in doing the work of a steam engine of forty horse-power was only two horse power. Without the water-bearing, it would be impossible to work this pump practically.

The PRESIDENT.—It was settled as early as Fitch's experiments, about the year 1784, that one propeller is just as good as a dozen together. He found that the first paddle moved the water, and was as effective as the series of paddles he at first proposed. In the ordinary chain pump, there is no friction except at the sides of the tube; and, if worked at a sufficient velocity, it produces excellent results. But, in the common pump, the water has to turn two courses, and this consumes more power than is required to lift the water.

Mr. SHAW explained the water bearing, and stated that in the first experiment of the large pump at the Novelty Works, he had holes bored twenty feet apart all the way up the tube. The pressure was found to be nearly the same throughout the whole tube. The current of water through the holes was very weak.

Mr. STETSON.—I should think that one propeller would do just as well as forty.

Mr. SHAW.—With one propeller there is a maximum height which you can lift the water.

Prof. THURSTON.—It seems to me that theoretically, Mr. SHAW is right. Starting at the bottom, with the water at rest, rotating the screw, it meets the water below this first guide curve or stationary blade. If that were not there, it would give the water a motion of revolution; and as soon as that becomes equal to the motion of the screw, we have reached the maximum elevation possible with that screw. But this guide curve takes the water, and from its rotary motion it rises directly upward, to a point where the pressure due to the height prevents its rising further. At this point there is placed a second propeller, which finds the water quiescent, and repeats the operation, lifting the water again to this point when the third propeller takes it, and so on. Now, suppsse we begin again, with the blades brought nearer together. The water rises above the first guide curve with a pressure sufficient to take it up six feet; that is with a pressure of three pounds to the square inch. The second propelier finds the water rising directly upward, and adds its pressure of three pounds to the square inch, so that the water rises above the second guide curve with a pressure of six pounds to the square inch. Still rising directly upward, the third propeller adds its force, making the pressure nine pounds, and so on. This view of the theory is corroborated by the statement of Mr. SHAW, that that is the actual fact.

Dr. VAN DER WEYDE — That would be true if the

water were not in motion; but the second propeller finds it in motion, and cannot add to that motion. The second propeller must be placed where the ascending motion has reached its highest point, and then it will carry it still further.

Mr. BLANCHARD—I think the effect would be the same as if we were to station several men on a ladder to pass up bricks from one to another. A dozen men placed far enough apart could toss a brick up to a considerable height. But place them together near the bottom, the lower ones throw it up a foot, the last one as far as he can, and that is as high as it will go.

Mr. SHAW—I do not think that is a parallel case.

Mr. STETSON—Let us consider for a few moments the question of friction in this pump. The friction which Dr. VAN DER WEYDE measured by the heating of the water escaping from the water-bearing, was only one element of friction in the machine. That was only the friction from the end pressure, whether at the bottom or the top, in supporting the pipe and its contents. In addition to that, there is the friction of the blades. With regard to that, it does not appear to make any difference whether the work is done by one pair or by many pairs; for in the latter case, although the friction of each will be less, that must be multiplied by the number, which will bring about the same result. Nor does it appear to matter much, in this respect, whether the blades are distributed through the length of the pipe, or accumulated at one point.

But in the third place, there is friction upon the pipe; and in respect to that, it does matter where the blades are placed. The friction upon the pipe varies with the pressure. If the blades are distributed along the length of the pipe, each lifting the water only two or three feet, and then another taking it, there is a gentle pressure the whole length of the pipe; as Mr. Shaw tells us was actually observed on boring the holes in the pipe at the Novelty works. But on the other hand, if the water is lifted the whole distance by one pair of blades or by a number of blades placed together at the bottom, assuming that with the exception of this element of friction the effect would be the same, it is evident that the pressure upon the pipe would be very great; for it would be at each point in the pipe the amount due to the height of the water from that point to the top of the pipe. As the friction would be correspondingly great, I should judge that the whole amount of the friction of the pump, would be at least ten per cent. greater from placing the blades at the bottom of the pipe.

The PRESIDENT—This subject will be again taken up after we have a report of the result of the further investigation which is to be made.

Professor R. H. THURSTON then made a detailed and interesting statement of the Stevens' experiments on bursting steam-boilers, a report of which has already been given in our columns, after which the meeting adjourned.

The Jersey City Water Works.

The following statement regarding the present condition of the Jersey City Water Works is taken from a communication by an engineer who was identified with the enterprise at the outset, and may be relied on for the accuracy and impartiality of the information which it gives. The letter referred to was published in the Jersey City *Times*, and contained also recommendations regarding future operations which are only of local interest, and which we omit, especially as we are not so profoundly impressed with the future greatness of our sister city as the writer in question.

In December, 1851, the Commissioners named in an act of the Legislature, approved March 18th, of the same year "To examine and consider all matters relative to supplying Hoboken, Van Vorst and Jersey City with a sufficient quantity of pure and wholesome water for the use of their inhabitants," made a written report of their proceedings to the Mayor and Common Council of Jersey City, in which sundry plans that had been suggested for accomplishing that purpose were described, and an account given of the surveys, examinations and estimates which had been made with a view to ascertain from what source and in what manner the desired quantity of water, of proper quality, could be most readily and cheaply obtained.

From among the plans which were submitted for their consideration, that of taking water from Passaic river at Belleville was adopted, and the works for raising, storing the water, and conveying and distributing it to consumers, were soon after constructed, and have, with such additions as were rendered necessary by a constantly increasing demand for water, thus far been found efficient and well fitted to accomplish the purposes for which they were intended. The supply has never for a single day been entirely suspended, and on but one occasion (the failure of an ill-designed and imperfect stand-pipe)* has the quantity furnished to consumers been less than they required.

In the report before referred to, the commissioners assumed that the number of persons to be supplied at some future day by the works proposed to be constructed, would not be less than 250,000, and as thirty gallons per day was the quantity supposed to be necessary for each, it was proposed that when completed in all parts, 7,500,000 gallons per day could be raised and distributed to consumers. The unexpectedly rapid increase of population within the former limits of Jersey City, the annexation of sundry adjoining municipalities, the erection of numerous manufacturing establishments, the establishment of new ferries, railroad stations and landings of lines of foreign steamships since the construction of the works, have already increased the demand for water to just about the quantity mentioned by the commissioners as the maximum.

It appears from the report of the Water Commissioners to the Mayor and Common Council, dated January 1, 1871, that the water raised during the year 1870 amounted to 337,014,354 cubic feet, which, divided by 365, and the quotient reduced to gallons, shows that an average of 7,386,616 United States gallons, or nearly 6,000,000 imperial gallons per day, were required to supply the demand. The quantity raised in 1870 was about 12¼ per cent. greater than in 1869, and we are warranted in supposing that the demand for 1871 will be increased in like proportion, or that for the current year, the consumption will reach 8,309,943 United States gallons per day, which is a near approach to the utmost capacity of the works in their present condition.

The quantity heretofore required has somewhat more than doubled in six years, the ratio of increase appearing greater during the last three years. Should this increase of consumption continue, as no doubt it will if the water is furnished, the amount required for 1875 will be about 16,5000,000 gallons per day, and for 1880 about 33,000,000.

The area of Hudson county somewhat exceeds that of the city and county of New York, and its local situation is such that it must, in a comparatively short time, be densely populated, and as the greater part of it is poorly supplied with water, fit for domestic or manufacturing purposes, a large proportion of that which will be required, must be brought from a distance, and works must be of course constructed for raising, storing and distributing it.

As it appears likely to become to a much greater extent than New York the seat of extensive manufactures, the quantity of water required in proportion to the population, will be greater than upon the other side of the Hudson. The capacity of the Croton aqueduct is found to be sufficient to bring into the city of New York 80,000,000 imperial gallons of water per day, all of which will be used,† and as Hudson county may, and probably will, have an equally dense population, it is not an extravagant assumption that an equal, or perhaps a larger quantity of water will be required for their use.

From an analysis made two years ago by Professor COOK, it appears that so far from deteriorating, as some have feared it would, Passaic water has improved in quality during the eighteen years which intervened between the analysis of Profs. HORSFORD and COOK. And as the minimum flow of the river must be about 200,000,000 United States gallons per day, there appears no reason to doubt that, if proper works are constructed for that purpose, the people of Jersey City and places adjacent, may rely upon receiving, in all time to come, an abundant supply of pure and wholesome water.

* The engineer who designed, and under whose direction the stand-pipe was erected was distinctly warned before the work was begun that, if made as designed, it would prove a failure.

† The area of a cross section of the Croton aqueduct is about 53.41 square feet; but as the depth of the stream flowing in it probably seldom exceeds five feet, a cross-section of if at that depth would be but 35 square feet, which, to deliver at the receiving reservoir 80,000,000 gallons per day must flow at the rate of about two and three-quarter miles per hour—a more rapid flow than was anticipated by the engineer under whose superintendence the aqueduct was constructed. But either that rate must have been reached, or the depth of water was greater than I have supposed, as Mr. Trautwine, the present chief engineer of the works, reported not long since that the aqueduct was capable of delivering that quantity.

THE AMERICAN INSTITUTE OF MINING ENGINEERS.

OFFICIAL BULLETIN.

Members and associates who have paid their dues will receive the ENGINEERING AND MINING JOURNAL every week. Official notices will be sent through this medium.

The next meeting of the Institute will be held in Philadelphia, beginning on Tuesday, February 20, 1872, at 8 P.M. The Council will meet at 3:30 P.M. of the same day. Messrs. LESLEY, DROWN, BLANDY, FRAZER, GAUJOT and LYMAN are the Local Committee of Arrangements.

Those intending to present papers at the next meeting are requested to notify the Secretary as early as possible.

The Third Rule is as follows: The annual subscription of each member or associate shall be ten dollars, *which shall be payable in advance at each annual meeting or immediately after his election.* Members or associates who have not paid their subscription are requested to remit immediately to

MARTIN CORYELL, Secretary,
Wilkesbarre, Penn.

Quantitative Estimation of Sulphuretted Hydrogen Mixed with Carbonic Acid.

According to Prof. R. FRESENIUS, a strong solution of sulphate of copper is first intimately mixed with and absorbed by pea-sized lumps of pumice-stone, and this mass dried at first gently, and afterwards heated to about 150 deg.—160 deg.; the dried lumps are next placed in U-shaped tubes, placed next to the gas-evolving apparatus being partly filled with fused chloride of calcium; 14 grms. of the pumice-stone, prepared as mentioned, may absorb 0·2 grms. of sulphuretted hydrogen; the material alluded to is very useful for determining sulphuretted hydrogen and carbonic acid, the latter being, of course, absorbed by soda-lime, and the gases dried previous to reaching the absorbents in ball-soda.

The Thinnest Iron Paper.

The Upper Forest Tin Works, near Swansea, England, have capped the climax of thin paper. They have produced a sheet, 10x5 2-3 inches, weighing 20 grains, which is but 16 grains for 44 surface inches, and it requires 4,800 placed side by side to make one inch in thickness. This stands on record as the thinnest sheet of iron ever rolled. The thinnest sheet of tissue paper to be purchased measures the 1,200th part of an inch—four times as thick as this.

THE COAL TRADE.

Anthracite Coals.

NEW YORK, Jan. 12, 1872.

WHOLESALE.—The market remains quiet, to dullness. There is no change to report in rates of freights. The Lehigh Company reports no surplus of egg and nut, and a small surplus of broken and stove—a condition of supply which seems to correspond pretty well with the state of the demand. The news from the coal regions since our last article is somewhat important. The trouble between the Wilkesbarre Coal and Iron Company and their miners has been amicably settled. The men have agreed to accept the reduction of 10 per cent. on wages, provided the company will reduce the price of powder and oil. This is satisfactory to the Company, and work commences in the Wyoming region on Monday, the 15th.

The Anthracite Board of Trade and the Miners' and Laborers' Benevolent Association have concluded an agreement in the Schuylkill region, dated the 6th inst., as follows:

I.—Wages to be fixed on a basis of $2 50 per ton for coal at Port Carbon, with outside labor at $10 per week, inside labor at $11 per week, miners by day work at $13 per week, and contract work at a reduction of 8½ per cent. below the basis price at $2 75 per year.

II.—All advance and decline to be at the rate of 1 per cent. on wages for every three cents advance or decline in the price of coal, with the understanding that when coal reaches $2 75 or upwards, the wages shall be the same as at the same prices of coal in 1871: *Provided*, That wages shall not be less than $2 50 basis price for more than two months out of the year, and that those two months shall be between April 1st and December 31, and that in those two months the wages shall not be less than at a $2 25 rate.

III.—Prices shall be obtained from a list of all collieries shipping over the Philadelphia and Reading Railroad, over 30,000 tons in 1871, and none shall be chosen a second time until the list is exhausted. Five operators shall be chosen by lot from this list on the first day of each month (if Sunday then the day preceeding,) by four persons, two to be chosen by the A. B. of T., and and two by the M. and L. B. A. The operators so chosen shall be required to forward to each side of the committee chosen above, on or before the 10th of the month, a statement of the average of all sales of coal (ex epting pea coal) for the preceding month, calculated at Port Carbon. The committee shall meet on the 10th of the month (or if Sunday, then the day preceding), and announce by circular the average obtained from the statements so presented, and the wages for the current month shall be based upon the average so obtained.

For the month of January it is agreed that wages shall be paid on the $2 50 basis.

Signed at Pottsville, Pa., on the 6th day of January, 1872, on behalf of the parties hereto.

For the A. B. of T.	For the M. & L, B. A.
Wm. Kendrick,	Jno. J. Williams,
J. K. Sigfried,	Jas. Ryan, Jr.,
Geo. W. Cole,	Jno. H. Dodsworth,
J. L. Nutting,	Wm. J. McCarty,
Chas. M. Hill, Jr.,	Michael Farrell.

This is a liberal arrangement for the miners, considering the state of the trade. Our objection to it on general grounds is, that it is too like all such complicated adjustments, likely to run well for a limited period only. The principle of a sliding scale and "basis," which seems to be in such favor in the anthracite regions, is a delusive one. The amount of honesty and good faith required on both sides to make it work well, would make out-and-out co-operation work still better. At least, that is our opinion.

The Delaware and Hudson Canal Company sends us the following prices of Lackawanna coal by cargo, on board vessel at Weehawken: Lump, $4 25; steamboat, $4 35; grate, $4 50; egg, $4 75; stove, $5 00; chestnut, $4 30.

RETAIL.—The Delaware and Hudson Canal Company offer Lackawana coal in their yard at the following rates, which are, it will be seen, for everything but Chestnut, from 25 to 50 cents higher than those we gave last week: Grate $5.25, Egg, $5.25, Stove $5.75, Chestnut $4.75.

BITUMINOUS COALS.

There is no change to note in this trade. Companies are delivering from stocks on hand. The Consolidation reports an increasing demand for picked lump, for domestic purposes at $10. This Company and the American are doing the heaviest business. The Maryland company has stopped work, ostensibly to settle up the old year's business. Probably recent internal difficulties and changes in the management have something to do with it. It is expected to resume before long. For the present the company is not attempting to make sales.

A new and powe ful company appears this year, the New Central Coal Co. of Maryland, Nos. 6 and 6½, Trinity Building. Mr. CONRAD, late of the Maryland Co., is the President, and the Board of Directors is a battery of very heavy calibre. The company has large tracts of the best coal lands in the heart of the Cumberland region; its mines are open and working; and it has already made large contracts for its excellent bituminous coal.

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Jan. 6, 1872, compared with the week ending Jan 7, 1871.

COMPANIES.	1871. WEEK.	1871. TOTAL.	1872. WEEK.	1872. TOTAL.
*Phila & Reading R.R†	74,085	480,085	20.68	300,645
Schuylkill Canal	....	.....	....	.....
*Lehigh Valley R. R.	56,403	339.009	47.553	281,629
Lehigh & Sus. R. R.	31,758	31,758	16,690	16,690
Lehigh Canal	....	.....	....	.....
Scranton North	467	467	10,296	10.296
" South	67	67	38.196	38.196
Penn. Coal Co., rail	618	6.8	18,793	18,7.3
" " canal	....	.....	....	....
Del. & Hud. Canal Co.	.....	.....	.....	.....
" " East	10,978	10.978	10 646	10,646
" " West	5,096	3,.96	5,312	15 312
South	.....	.....	6,003	6,00:
Shamokin	6,463	6,463	2 377	2,377
Trevorton	....	.....	....	....
Lykens Valley Coal Co.	....	.....	....	....
Wyoming South	....	.....	....	....
Wyoming North	....	.....	....	....
P. N. Y. C. & R. R. Co.	6,477	29.087	....	....
Williamstown Co'y	1,.53	1,.55	....	....
Big Lick Col	....	.....	....	....
Total	191,767	873.583	175,931	690,587
1870	175,934	690,587		
Decrease	15,833	182,996		
Increase				

* These figures are for the week and fiscal period commencing Nov. 30

† Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Jan. 6, 1872, compared with week ending Jan. 7, 1871.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
C. & O. Canal	.....	.....	....	.....
B. & O. R. R.	13,297	13.297	16,200	16,200
H. & B. T. R. R.	3,339	3 339	4,354	4 354
*Harrisburg & D.	5,842	13,638	8.547	65,631
*L. V. R. R.	....	1 615	4.898	23,110
P. & N.Y.C & R. Co.	3,784	21,798	....	....
Cumberl'd Branch Canal	....	.....	....	.....
" Railroad	....	.....	....	.....
Total	26,260	53,687	33,999	109,295
Decrease			26,260	53,687
Increase			7,739	55,608

The tonnage of the P. & N. Y. C. & R. R. Co. is included in that of the L. V. R. R. Co.

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending Jan. 6—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872, tons ct	WEEK 1871, tons ct.	YEAR 1872 tons cwt.	YEAR 1871, tons. cwt.
Wyoming Region	10050 09	2086: 02		
Upper Lehigh Region	2837 13	3069 19		
Beaver Meadow Region				
Hazleton Region	128 18	539 07		
Mahanoy Region				
Treskow Region	1554 15	610 18		
Mauch Chunk Region	5457 01	8205 01		
Totals	20028 19	33459 06		
Increase	13430 07			
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	16690 00	31757 13		
Forwarded East of Mch Chunk by Canal				
Delivered at and above Mauch Chunk	1338 01	1501 13		
Delivered to L. & B. R. R. at Plymouth Bridge	1828 12			
L. V. R. R. at Packer'n	172 06			
Totals				
Of the above there was transported on acc'nt of L. C. & I. Co.	6142 07	8375 11		
W.-B. C. & I. Co.	6076 18	18483 13		
Totals	12219 05	26859 04		
Increase				
Decrease	14639 19			

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Jan. 6, 1871.

	1872. WEEK.	1872. YEAR.	1871. WEEK.	1871. YEAR.
By Railway	18,792 17	18,792 17	617 16	617 16
" Canal	.....			
Total	18,792 17	18,792 17	617 16	617 16
Decrease 1872, 18,175 01				

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, January 6, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair	12,185 09	
" Port Carbon	230 14	
" Pottsville	21 04	
" Schuylkill Haven	1,152 15	
" Pine Grove	398 15	
" Tamaqua	2,2.2 16	
" Harrisburg		
" Daupain	22 13	
Total	16,264 03	

FOR SHIPMENT BY CANAL.

Passing Frackville Scales		
" Mill Creek "		
" Schuylkill-Valley Scales		
" Mt. Carbon "		
" Cressona "		
" Pine Grove "		
" Tamaqua "		
Total		

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	31 05	
" Shamokin	880 01	
" Herndon	.....	
Total	911 06	

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	131 09	
" Lebanon & Pine Grove Branch	70 17	
Total	201 06	

CONSUMED ON LATERALS.

From Frackville Scales	579 04	
" Mill Creek "	24 13	
" Schuylkill Valley Scales	13 15	
" Mt. Carbon "	412 16	
" Cressona "	108 01	
" Pine Grove "	125 03	
" Tamaqua "	230 12	
Total	1,703 04	

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a br.	172 19	
" " Alburtis, " "	25 05	
" " Oreland, G. & N. Br.	671 09	
" " Connecting R. R.	.....	
" " Willow Street R. R.	117 14	
Total	987 07	

BITUMINOUS.

From Harrisburg	8,316 01	
" Connecting R. R., G. & N. Br.		
" Junction R. R.	230 10	
Total	8,546 11	

COAL FOR COMPANY'S USE.

Anthracite	3,597 18	
Bituminous	333 11	
Total.	3,931 09	

RECAPITULATION

	Total for Week.	Cor. week last year.	Increase & Decrease.
Passing over Main Line and Leb. Val Branch	16,264 03	64,181 09	d 47,917 26
For Shipment by Canal			
Shipped Westward via Northern Central R. R.	911 06	4,322 02	d 3,410 16
Shipped West or South from Pine Grove	2:2 09	303 04	d 102 15
Consumed on Laterals	1,703 04	3,825 01	d 2,121 17
Lehigh and Wyoming Coal	987 07	1,451 16	d 464 09
Total Anthracite paying fr'gt	20,068 09	74,083 12	d 54,017 03
Bituminous	8,543 11	5,842 15	i 2,700 16
Total of all kinds paying fr'gt	28,614 17	79,928 07	d 51,313 10
Coal for Company's use	3,981 09	4,555 09	d 574 00
Total Tonnage for Week	32,596 06	84,483 16	d 51,887 10
Previously this year	353,165 02	418,901 18	d 65,736 16
Total to date	385,761 08	503,385 14	d 117,624 06

SHIPPED BY CANAL.

From Schuylkill Haven			
" Port Clinton			
Total Tonnage per Week			
Previous y this year			
Total to date	13,355 16	36,225 17	d 22,870 01

Lehigh Coal and Navigation Company,

Report of Coal transported over the Lehigh Canal and L. & S. Div. of Central Railroad of New Jersey for the week ending Jan. 6, 1871, and for the year 1871.

	WEEK.	YEAR.
Forwarded East of Mauch Chunk by Rail	16,690	16,690
Delivered at and above do.,	1,338	1,338
Forwarded East of do., by Canal	.....	
	18,028	18,028
Corresponding period last year—		
Forwarded East of Mauch Chunk by Rail	31,757	31,757
Delivered at and above do.,	1,501	1,501
Forwarded East of do., by Canal		
	33,259	33,259
Increase on Railroad	15,231	
Decrease " "		
Increase on Canal		
Decrease " "		
Of the above there was transported on account of—		
Lehigh Coal Nav. Co	6,142	6,142
Wilkesbarre Coal & Iron Co	6,076	6,076
	12,219	12,219
Corresponding period last year—		
Lehigh Coal Nav. Co	8,375	8,375
Wilkesbarre Coal & Iron Co	18,483	18,483
	26,859	26,859
Increase		
Decrease	14,639	

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Jan. 6, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	10,308 19	66,274 18
" Hazleton	29,881 19	166,395 15
" Upper Lehigh	102 12	346 13
" Beaver Meadow	11,783 14	66,163 08
" Mahanoy	1,900 06	25,676 08
" Mauch Chunk	62 04	375 08
" Sullivan & Erie	265 08	5,124 04
Total Anthracite	55,094 09	330,376 12
Bituminous Coal via P. & N. Y. R. R.	4,898 02	23,109 18
Bituminous Coal from all sources		883 00
Total by rail and canal	59,992 02	354,369 10
Same time last year	65,515 17	360,010 04
Increase		5,640 14
Decrease	5,523 15	
Forwarded East from Mauch Chunk by rail	47,553 10	281,629 02
Same time last year	56,403 05	309,008 13
Increase		
Decrease	8,849 15	27,379 11

RECAPITULATION.

Forwarded East from Mauch Chunk by rail	47,553 10	281,629 02
Forwarded North from L. & B. Junction.		
To N. C. R. R., at Mount Carmel	5,329 04	33,176 14
To L. & S. R R. at Packerton for rail	93 11	73 06
Delivered at M'h Chunk	34 12	1,053 08
Delivered on line of road above Mauch Chunk	476 18	234 04 3,096 13
Delivered above Mauch Chunk for use of L. V. R.R.	1,466 06	6,454 00
To L. & S. R. R., at Penn Hav., for railroad	139 19	3,638 11
Do. for canal		864 07
At M.Chunk for canal		99 07
Total Anthracite	55,094 09	330,376 12
Bituminous Coal	4,898 02	23,992 18
Total all kinds	59,992 02	354,369 10

This report includes all Bituminous Coal carried over the Lehigh Valley and P. & N. Y. Railroads from December 1st 1870 to date.

Delaware and Hudson Canal Company.

The following is a statement of Coal Transpo ted by the Delaware and Hudson Canal Co. for the week ending Jan. 6, 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,		
By Railroad, East	10,646	10,646
" " West	5,312	5,312
" " South	6,003	6,003
Total Tons	21,961	21,961

For the same period last year.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,		
By Railroad, East	10,978	10,978
" " West	3,096	3,096
" " South		
Total Tons	14,074	14,074
Decrease	7,887	

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Jan. 6, 1871.

	WEEK.	SEASON.
North	34,830 05	34,830 05
South	6,003 07	6,003 07
Total 1872	40,833 12	40,833 12
Corresponding time in 1870:		
North		
South		
Total		
Increase North		
Decrease North		
Increase South		
Decrease South		
Total decrease 1872		
Total increase 1872	40,833 12	40,833 12

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna and Western R. R., for week ending January 9, 1873:

	Week. Tons. Cwt.	Year. Tons. Cwt.
Shipped North	10,295 11	10,295 11
Shipped South	38,196 09	38,196 09
Total	48,492 00	48,492 00
For the corresponding time last year:		
Shipped North	467 08	467 08
Shipped South	67 00	67 00
Total	534 08	534 08
Increase	47,957 12	47,957 12
Decrease		

Coal transported on the Delaware, Lackawanna and Western R. R. for week ending Dec. 30, 1871,

	Week. Tons Cwt.	Year. Tons. Cwt.
Shipped North	14,795 17	559,973 10
Shipped South	44,334 15	1,356,513 02
Total	59,130 12	1,917,486 12
For the corresponding time last year:		
Shipped North	1 803 17	669,843 04
Shipped South	395 15	1,678,258 04
Total	2,204 12	
Increase	56,926 00	
Decrease		431,614 16

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Jan. 6, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B.&O.R.R. Co Tons Cwt.	Total. Tons. Cwt.
1871	.....	16,200 09	16,200 09
1870	.....	13,297 08	13,297 08
Increase		2,903 01	2,903 01
Decrease			

YEAR.

1871	.....	.....	16,200 09
1870	.....	.....	13,297 08
Increase	.....	.....	2,903 01
Decrease			

Huntington and Broad Top R. R. Co.

For week ending Jan. 6, 1871	4,354 tons.
Same time last year	3,339 "
Increase	1,013 "
Decrease	
Total amount shipped to date	4,354 "
Same time last year	3,339 "
Increase	1,013 "
Decrease	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, Jan. 14.		AT PHILADELPHIA. Jan. 13.	
SCHUYLKILL.	R. A.	W. A.	R. A.	W. A.
Lump	$- —	$- —	— —	— —
Steamer	4 50	— —	— —	4 50
Broken	4 60	— —	— —	— —
Egg	— —	— —	5 00	— — 4 75
Stove	5 00	— —	5 00	— — 5 00
Chestnut	4 25	— —	— —	— —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 00	— —	— —	— —
Broken	4 75	— —	— —	— —
Egg	4 50	— —	— —	— —
Stove	5 25	— —	— —	— —
Chestnut	4 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Honey Brook, Le'h W. A.	4 50@5 25		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Creek " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Old Comp'y's " "	4 25@5 25		— —	— —
Cross Creek " "	— —@— —		— —	— —
Room Run " "	4 25@5 25		— —	— —
Girardville " "	— —		— —	— —
McMichael " "	— —		— —	— —
Shamokin " "	— —		— —	— —
Lykens Valley " "	6 00		— —	— —
Broad Top " "	— —		— —	— —
Hill & Harris " "	— —		— —	— —
Henry Clay " "	— —		— —	— —
Powelton "	— —		— —	— —

*Dealers in these coals may be found in our advertising columns.

Company Coals.

Jan. 1872.

	L.	Str.	Gra.	Eg.	Sto	Chest
*Scranton at E. Port	3 45	4 00	4 00	4 15	5 00	4 05
*Pittston at Weehawken	4 60	4 60	4 80	4 90	5 20	4 60
*Lackawana at Weehawken	4 20	4 35	4 50	4 75	5 00	4 50
Wilk'b're at Hoboken	4 00	4 25	4 40	4 50	5 25	4 25
Old Co. Lehigh at PtJohn'n	5 00	—	4 75	4 50	5 25	4 25
Lehigh at Eliz. Port	5 00	—	4 75	4 50	5 25	4 25

For freights to different points see "Freights."
* To contractors.

Line Prices for Coal Dec, 1871,

	Lump	Broken	Egg	Stove	Ches'
At Mauch Chunk	4.00	4.00	4 00	4.25	3.00
" Wilkesbarre	3 75	3.75	3.75	4.00	3.00

Prices at Baltimore—DEC., 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 60@5 85
Pittston and Plymouth, do	— —@5 60
Shamokin Red or White Ash, do	— —@5 60
Lykens Valley Red Ash, do	— —@6 30
Zerba Valley	— —@— —
Trevorton	— —@— —
By retail, all kinds per ton of 2240 lbs	7 00@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 50@4 70
Fairmount and Clarksburg gas, f. c. b. at L. Point	6 00@6 50
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein f.o.b. at Phila	$ —
Lemon " " "	—
Cumberland Vein Coal	—
Consolidation Coal Co.'s on board N. Y.	7 50
Maryland Coal Co. " "	7 50

Prices at Georget'n, D.C., & Alexandria, Va.

Jan. 1872.

George's Creek and Cumberland f. o. b. for shipping $4 50

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$5 25@5 50
Lykens Valley	6 25@6 50
Shamokin Red or White Ash	5 50@5 75
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

Jan, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

Duty, $1 25, gold

	Coarse.	Slack.
Block House	$1 75 @ 1 75	
Gowrie	1 75 @ 1 75	

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coa
Pictou	$2 25 @1 25	
Sydney	2 25 @- 80	
Langan	1 60 @- 80	
Little Glace Bay	1 60 @1 00	
Caledonia	1 60 @- 80	

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal

AMERICAN.

	Currency.
Westmoreland	$7 00 @- —
Fairmount Gas Coal Co. of N. Y.	7 00 @- —
Despard Coal Co	7 00 @- —
Penn	7 00 @- —
Newburg Orrel Gas	— — @- —
West Fairmount Gas Coal	7 00 @- —
AT PHILADELPHIA.	
Powelton	$6 75
TO NEW YORK.	
Provincial	
Sidney	$2 25
Lingan	3 25
Cow Bay	3 37½
Port Caledonia	3 37½
Little Glace Bay	3 25

Prices of Foreign Coals.

Jan, 1872.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	12 00@13 00
" House "	18 00@20 00
" Orrel	14 00@16 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@17 50
"Cannel, "	18 00@20 00
Per ton 2,000 lbs. delivered.	

Freights.—Jan. 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Philada.	Anthracite. From Elis. Port, Port Johnson, and Hoboken.	Anthracite. From Newburg...	Anthracite. From Rondout...
Amesbury						
Bangor						
Bath		4 00		3 00		
Boston		2 30		1 10		
Bridgeport						
Bristol						
Cambridgeport						
Derby						
Dighton						
East Cambridge		3 50		1 80		
Fall River						
Hackensack						
Hartford				55		
Jersey City						
Middletown						
Mystic		3 50				
New Bedford						
Newburyport		3 50		1 10		
New Haven		3 25	3 50	1 25		
New London				1 40		
Newport		2 50		55		
New York				1 10		
Norwalk				1 50		
Norwich				1 00		
Pawtucket						
Portland		4 00				
Portsmouth, N.H		3 50				
Providence						
Rockport						
Saco						
Sag Harbor						
Salem				1 20		
Stamford						
Stonington				1 10		
Taunton				1 25		
Warren						
Washington						
TO RIVER PORTS.						
Albany						
Catskill						
Cockaackie						
Coeyman's						
Cold Spring						
Fishkill						
Haverstraw						
Hudson						
New York						
Nyack						
Poughkeepsie						
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy						
West Point						
Yonkers						

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption	$2 18
For reshipment	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	1 06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 13

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 13

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Phillipsburgh	$ 72
Morris & Essex R. R. Phillipsburgh to Hoboken	1 06
Shipping expenses	25
Wharfage	10
Total	$2 13

TO SOUTH AMBOY.

L. V. R. R.	72
B. & D. R. R.	91
Cam. & Am. R. R.	35
Shipping Expenses	
Total	$1 08

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	88
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	25
Wharfage	10
Total	$ 3 [illegible]

MARKET REVIEW.

FOR THE WEEK ENDING JANUARY 13th 1872.

IRON—The market for Scotch Pig has been rather quiet, but prices are without change; 550 tons Glengarnock sold, to arrive, on private terms; we quote Eglinton $33@$34, Glengarnock $34@$35, and Coltness $40. The demand for American has been entirely for small parcels to supply the immediate wants of consumers, at about former prices. New English Rails continue in demand, and a further advance has been established; sales 5000 tons, 56 lb., at $69 gold, the market closing strong at $63. American are steady at $70@$71 currency; 223 tons old D. H. sold at a private price. The market for Refined Bar is very firm at the advance noted in our last and the English price has advanced to £11 5s. for common marked Bars. Sheet continues very firm at our quotations. We note a sale of 3000 bdls. galvanized Sheet to go West, on private terms—market firm at 20 per cent. discount. Russia Sheet is quiet—50 packs stained sold on private terms.

LEAD—Pig emains quiet and prices are nominally as before, say $5,90@$6 gold for Foreign, Bar 9¼ cents, Sheet and Pipe 10, and Tin-lined Pipe 15, less 10 per cent. to the Trade.

COPPER—The manufacturers of Copper are very firm at our quoted prices. Yellow Metal Sheathing is advanced to 26 cents, and Bolts and Nails also to 26; Y. M. Slating Nails, 28. Ingot continues very firm, and a further advance of ¼@¼ cent per lb. has been established. The rumor of an additional rise of £5 per ton in London, noted in our last, has been confirmed, Chile Bars now being quoted, per cable, £89, and Best selected English £98. Sales have been made of 500,000 lb. Lake at 27¾@28 cents cash, and January delivery, and 28¼@28½ for F bruary delivery, most of the business for delivery this month.

SPELTER—There has been no business. The stock of Foreign is held firmly at 7¼@7½ cents gold, domestic 10 cents currency.

STEEL—The market continues steady and strong at our quotations.

TIN—The market for Pig is at a stand, and prices are nominal, but tend in buyers favor; the latest telegrams from London quote Straits 144s., and English 152s.; here Straits is held at 37¾ cents, English 37½, and Banca 42 all gold. Plates sell moderately and at full prices, the advantage being rather with the seller; the transactions embrace 1503 bxs. Charcoal Tin at $9,37½@$9,50 for I. C.; 1000 do. Charcoal Terne, $8,37½@8,50; 200 do., $8,25; and 500 do. I. C. Coke Tin, 10 by 18, $8,50, all gold.

ZINC—Sheet is very quiet at our quotations for small lots from store—there have been no sales of Mosselmann recently from agents' hands. Sheet is held at 11c., currency.

Manganese black oxide 3½ cents.
" " gray Porolusite 5½ cents.

METALS.

NEW YORK, Jan 13, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ₩ lb; Railroad, 70 cents ₩ 100 lbs.; Boiler and Plate, 1¼ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₩ lb; Pig, $7 ₩ ton; Polished Sheet, 3 cts. ₩ lb; Galvanized 2½; Scrap Cast, $6; Wrought, $8 per ton.

	Store Prices
Pig, Scotch No. 1, ₩ ton	33 50@ 40 00
Pig, American, No. 1	36 00@ — —
Pig, American, No. 2	34 00@35 00
Pig, American, Forge	33 00@34 00
Bar Refined, English and American	— —@ 86 00
Bar Swedes, assorted sizes (gold)	95 00@100 00
	Store Prices, Cash.
Bar, Swedes	112 00@122 50
Bar, Refined, ord'y sizes	92 50@ — —
Bar, Refined, 1½ to 6 by ½ @ 5-16 inch	97 50@ — —
Bar, Refined, 1 & 1½ by ¼ & 5-16	100 00@ — —
Bar, Refined, 2½ to 3 Round & Square	97 50@ — —
Scroll	110 00@140 00
Ovals and half-round	110 00@130 00
Band	— —@117 50
Horse Shoe	105 00@115 00
Rods, ⅜ to 3-16 inch	97 50@132 50
Hoop	112 50@160 00
Nail rod	7 @ — —
Sheet, Russia, as to assortment (gold)	15 @—15½
Sheet, Single, D. and T. Common	—5¼@— 6
Sheet, D. and T. Charcoal	—6 @— 6¼
Sheet, Galv'd, Nos. 14 to 26 ..... 21 to 31 ct. dis.	12@14c lb.
" " Nos. 27, 28, and 29 ..... 20 to 30 ct. dis.	15@18c lb.
Rails, English (gold), ₩ ton	63 00 @ 00 00
Rails, American, at Works in Pa	70 00 @71 00

COPPER—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ₩ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₩ lb	— @— 34
Copper Bolts	— @— 36
Copper Braziers, 16oz. and over	— @— 36
Copper Nails	— @— 40
Copper, Old Sheathing, &c. mixed lots	25½@— 26
Copper, Old, for chemical purposes, 14@16 oz	— @— —
Copper, American Ingot	27¼@— 28
Yellow Metal, New Sheathing & Bronze	— @— 26
Yellow Metal Bolts	26 @— —
Yellow Metal Nails	— @— 26

LEAD.—Duty: Pig, $2 ₩ 100 lbs.; old Lead, 1½ cents ₩ lb; Pipe and Sheet, 2½ cents ₩ lb.

Galena, ₩ 100 lbs	$— @— —
Spanish (gold)	5 80 @6 00
German, do	5 80 @5 90
English do	5 90 @6 15
Bar (net)	9 25 @ —
Pipe (net)	— — @10 00
Sheet	— — @10 00

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ₩ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 3½ cents ₩ lb, and 10 ₩ cent ad val. (Store prices.

English Cast (2d and 1st quality) ₩ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11 @— 13
English German (2d and 1st quality)	— 10½@— 12
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 15 @— 16
American, Spring, do.	— 9 @— 11
American Machinery, do.	— 9 @— 10
American German, do.	— 9 @— 11

TIN.—Duty: Pig, Bars, and Blocks, 15 ₩ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₩ cent.; Rolling 25. ad val.

	Gold ₩ lb.
Banca	42 @—
Straits	37¼@—
English	37½@—

PLATES. Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₩ box	$9 50 @9 75	$10 25 @11 00
I.C. Coke	8 50 @9 25	9 25 @10 25
Coke Terne	7 75 @8 00	8 75 @ 9 25
Charcoal Terne	8 50 @8 75	9 75 @10 25

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb	7 12½@ 7 50
Plates, Domestic p. lb.	— 7 @— 11

ZINC.—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c per lb

Sheet per lb.	— 10½@—11½

San Francisco Stock Market.

BY TELEGRAPH.

The following report from the San Francisco Stock Market is dated the 9th inst: With the exception of a slight reaction in Kentuck, the market is decidedly firmer. Gould & Curry figures most conspicuously in the advance items, it is selling in the Board at $143, an advance of $32 per share compared with our last report. Crown Point is gaining on Belcher, the latter is quoted at $470, while the former is manipulated in the Board at $465, and thereabouts Belcher declared a dividend of $10 per share on the 5th inst. payable on demand. Eureka G. V. is appended to the report as selling at $20—a price which has been uniform with that item for a long time past.

Savage	50
Yellow Jacket	61
Kentuck	149
Chollar Potosi	37
Gould & Curry	143
Belcher	470
Crown Point	465
Ophir	..
Imperial	48
Amador	..
Eureka G. V.	20
Meadow Valley	..

Mining Stocks.

Our reports from the Mining Stock Board were unavoidably crowded out last week; the following list of gold stocks evinces but little alterations as compared with the prices reported to us last week. The sales for the past week are all comprised in a transfer of 100 Central on the 7th inst., at 5.

GOLD STOCKS.

	BID.	ASKED
American Flag	—	20
Bates & Baxter	25	—
Benton	—	—
Black Hawk	30	—
Central Gold	—	4
Cons Gregory	—	24
Grass Valley	—	—
Gunnell	8	—
Holman	—	—
La Crosse	17	19
Liberty	—	—
Mariposa prf	—	—
Montana	—	—
Rocky Mount	—	5
Quartz Hill	4	7
Smith & Parmlee	10	—
N. Y. & Eldorado	—	—

The Petroleum list has advanced, Brevoort exceptionably so being quoted at from $2 50 to 5 00 per share; the following is the report in full. No sales.

PETROLEUM STOCKS.

	BID.	ASKED.
Bennehoff Run	15	—
Bergen Coal and Oil	—	—
Bliven Oil	—	—
Blood Farm	—	—
Brevoort	2 50	5 00
Buchanan Farm	—	—
Central	60	—
Clinton	—	—
Home	1 10	—
National	—	—
New York & Allegheny	1 10	—
Northern Light	30	—
Phillips Pet	5	10
Pikhole Creek	—	1 00
Rathbone Oil	20	—
Rynd Farm	30	—
Second National	—	40
Sherman & B	—	—
Tarr Farm	—	—
United Petroleum Farms	25	35
United States	40	55

American Iron Statistics.

The number of hands employed in the primary production of iron in the United States is roughly estimated at 140,000; 58,000 of whom work in rolling mills, 42,000 in preparing ore and fuel, 25,000 in preparing fuel for rolling mills, 12,500 in blast furnaces, and 2,500 at forges and bloomeries. Add the 800,000 engaged in manufacturing articles of iron, and we have a total of 940,000. The approximate value of the pig iron manufactured last year was $75,000,000. Adding to this the product of the rolling mills and forges, the amount is $138,000,0000. Adding, again, the value of articles manufactured of iron, and the value of the iron manufacture of the country for the year is $900,000,000. Of rails we produced in 1853 but 87,000 tons, and in 1869 the amount had risen to 580,000. Of steel rails we laid in the latter year 50,000 tons, 15,000 of which were of domestic manufacture, and it is further estimated that the quantity of steel rails laid this year will reach 150,000 tons.—*Iron World and Manufactures.*

THE

SCIENTIFIC PRESS, FOR 1872.

VOL. XXIV.

The weekly issues of the PRESS will contain reliable

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ANNUAL REPORT OF THE AMERICAN METALLURGICAL COMPANY, organized pursuant to the General Manufacturing and Mining Law of 1848, and the amendments thereto. Amount of capital, $500,000, the whole of which has been issued in payment for the property of the Comapny. No debts.

D. R. STANFORD, President.
B. R. WESTERN,
R. W. RAYMOND,
A. EILERS, Majority of Trustees.

Dated New York, January 10, 1872.
City and County of New York, ss:
R. W. Raymond, being duly sworn, says that he is the Secretary of the above-named company, and that the foregoing report is true.
Sworn to before me this 10th day of January, 1872.
WM. F. McNAMARA, Notary Public.

ANNUAL REPORT OF THE ADELBERG GOLD COMPANY, organized pursuant to the General Manufacturing and Mining Law of 1848, and the amendments thereto. Amount of capital, $500 000, the whole of which has been issued in payment for the land, mines and other property of the company. The amount of existing debts does not exceed one thousand dollars.

R. W. RAYMOND, President.
LORIN PALMER,
A. H. SCOVILLE, Majority of Trustees

Dated New York, January 10, 1872.
City and County of New York, ss,:
R. W. Raymond being duly sworn says that he is the President of the above named company, and that the foregoing report is true.
R. W. RAYMOND.
Sworn to before me this 10th day of January, 1872.
WM. F. McNAMARA, Notary Public.

DEPARTMENT OF POPULAR SCIENCE.

Combustion.

An admirable lecture on this subject, delivered by Prof. CHARLES F. CHANDLER of Columbia College at the Academy of Music on Friday evening, the 5th inst., contained some suggestions which may justly be ranked under the head of popular or, perhaps better, practical science. The experiments of burning various bodies in oxygen gas were first made, and then the reciprocal nature of combustion was fully shown and demonstrated. We say, in common parlance, that hydrogen gas will burn, and that oxygen will not burn, but will support combustion, whereas, in fact, oxygen will burn just as well as hydrogen, if only the experiment be made in the proper atmosphere. In hydrogen gas and in ammoniacal gas oxygen was shown to burn with a clear flame. Ordinary street gas (carburetted hydrogen) was burned in a vessel containing chlorine, and antimony and sodium were burned in the same gas. From a vessel containing hydrogen gas a small jet was allowed to escape, and on being ignited, it burned with the peculiar dull hydrogen flame; at the same time a jet of oxygen was introduced and lighted in the same vessel, showing the hydrogen to be in the one case a combustible gas, and in the other a supporter of combustion.

The old phlogistic theory of combustion was briefly alluded to. It was supposed that certain bodies contained phlogiston, and that when they are burned this substance is liberated. When, however, it was discovered that these bodies were heavier after being burned, the phlogistic theory was still sustained, on the supposition that phlogiston was an exceedingly light substance, and buoyed the body up till it was set free. LAVOISIER first announced the fact that ordinary combustion was simply oxidation, and Sir HUMPHREY DAVY first said that the heat evolved during combustion was due to the rapid vibration among the particles.

The heat evolved does not depend upon the length of time employed in combustion. A piece of wood which rots slowly in the forest, gives out the same amount of heat as though it were rapidly consumed in a fire. The presence of light sometimes influences combustion. A mixture of hydrogen and chlorine may be kept for a long time in the dark, but when exposed to light the gases will combine.

It was then shown that all inflammable bodies have a certain temperature at which they burn or combine rapidly with oxygen. A few gases, such, for example, as phosphuretted hydrogen, burn spontaneously in the air at the ordinary temperature. This fact is made use of in determining the safety of kerosene oils. If an oil will not give off an inflammable gas at a temperature below 125 degrees, or itself burn at a temperature ten degrees higher, it is considered safe, but by purchasing a large number of samples at various retail stores in the city, it had been found that only an exceedingly small portion of the kerosene sold was at all safe to have in a house, or to be burned in any ordinary lamp. This is due to the desire on the part of the manufacturer to make money too fast. There is not the same demand for naptha and the lighter products of petroleum distillation that there is for the heavier ones, and hence they are cheaper. Some of the most dangerous compounds sold are advertised as *safety oils*. The sale of these compounds should be prohibited, or else they should be sold for what they really are. There are only two or three safe oils in the market; that of the DOWNER Company being the best. Next to incendiarism, to kerosene are due more fires in the United States than to any other cause.

The mechanical condition in which a body may be has an influence on its burning temperature; if very finely divided, so as to present a very large surface to the oxidizing influences of the atmosphere, it will burn at an unusually low temperature. It was shown that very finely divided particles of iron took fire spontaneously when dropped from the hand on to the floor. The spontaneous combustion of olive oil and sawdust, cotton waste and oil, and various other substances was alluded to.

If we mix two mutually combustible gases together they form an explosive compound. This is well known and is often shown by mixing oxygen and hydrogen together. The recent explosion at the works of the Metropolitan Gas Company was due to this cause.

The explosion takes place because the particles all ignite at the same time. Oxygen is present throughout the entire mass and also hydrogen, and no time is needed to complete the combustion of the whole. In the same way, if we mix two solid bodies which are mutually combustible, such as charcoal and saltpetre, they will ignite with an explosion, a large volume of gas being instantaneously liberated.

The bright flames of our ordinary street gas or of lamps and candles are due to the presence of particles of solid carbon, which become incandescent in the heat of the flame. In a general way, we may say that bright flames are produced by high temperatures and the presence of solid particles.

The subject of street gas was then discussed, and it was shown that the difficulty which we find in lighting our houses is due more to the imperfect state of the distributing pipes in the streets and the condition of the burners which we employ than to the inferior quality of the gas. The gas of all the New York companies will average nearly or quite sixteen candle power.

It was then shown how light fabrics, such as children or ladies' dresses could be made fire-proof by mixing tungstate or phosphate of soda in the starch used in stiffening them.

The use of soluble glass for rendering wood fire-proof was also recommended, and creosote for preventing decay. The phenomena of respiration of living beings and of plants was alluded to. The lecturer closed by showing how a fire-proof building could be built at but a slight extra expense over the present dangerous style of building.

We regret that we cannot give a more detailed account of this entertaining and instructive lecture. Those who heard it, doubtless desire to hear Dr. CHANDLER again, even if he does not lecture before the audience of forty thousand to which he alluded, and those who did not hear him will never know what they missed, unless they peruse a better account of the lecture than we have been able to give.

W. P. W.

About Town Jottings.

LIGHT AND HEAT.

Tuesday evening, January 9, in response to invitations from the New York Gas Light and Heat Company, some two hundred gentlemen interested in reducing the price of gas light and members of the press, gathered at the Grand Central Hotel to witness the demonstration of Dr. W. ELMER'S new process of generating coal gas. The new system consists essentially in subjecting coal, wood, or peat to the process of distillation out of contact with the atmosphere, in the usual way, but at low temperature, just sufficient to eliminate, in the form of vapor, the volatile products contained in the coal or other material employed. The vapors, as fast as eliminated from the material employed, are conveyed directly into other retorts under a much higher heat than that required to displace the vapors, by which means they are converted into gas. In the chemical reaction that takes place in the formation of gas, a portion of the carbon contained in the hydrocarbon vapors is deposited in the retorts where it becomes highly heated; the aqueous vapor formed from the elements in the coal during the distillation is decomposed by being brought in contact with this highly heated carbon; hydrogen is set free, and carbonic oxide formed. In this method all the vapors eliminated from the coal are decomposed and converted into permanent gas, so that there is no waste of material by condensation as in the old process.

After partaking of a fine collation, the company called on Dr. ELMER for a statement of the practical results as to the comparative cost of producing gas by the new system, the light being by far the most brilliant and pleasant to the eye of any in the city, speaking for itself and needing no praise. In response, Dr. E. said that no satisfactory test, capable of being reduced to figures had yet been made, but the company were prepared to guarantee a light as good as that which illuminated the room, at a reduction of one hundred per cent. of the prices charged by any metropolitan company. A so much greater amount of gas can be extracted from a given quantity of coal by the new than by the old system that it can be used economically for heating purposes, instead of ordinary fuel. In concluding, he said:

The gas is permanent in its character; that is, it does not contain condensable vapors as does the gas by the old process; and hence gas works when practicable, may be located at the coal mines, and the gas conveyed through viaduct mains to cities, irrespective of the distance, thus effecting an immense saving in the transportation and handling of coal.

Remarks from officers of the company, and other scientific and practical men served to pleasantly fill nearly an hour, when the company dispersed, confident that better and cheaper light would soon be furnished to all who desired it.

NEW STEAM PUMP.

The New York agents of GEO. F. BLAKE & Co., 79 Liberty-street, have just received from the factory a novel pump, especially adapted for hotels, which they are setting up in the Sturtevant House in this city. It is a *duplex pump*, worked with a *single steam cylinder*, by which the main objection to other single cylinder pumps—"telegraphing" the stroke in the pipe,—is remedied. If the practical tests at the hotel tally with experiments at the factory, the builders will have added materially to their already very extensive business. We await the result of the proposed tests, and if they are satisfactory, shall illustrate and describe in detail this new invention

BROOKLYN BRIDGE.

Work at the New York end of the Brooklyn Bridge is progressing more rapidly than that on the opposite shore, as so many more men can be employed. The caisson been has sunk to the river bottom, and the steam dredging machines are at work removing the mud and dirt. About forty men are at work within the caisson. The sides, which were covered with mud and slime, have been cleaned, and any enterprising or adventurous genius who has the cheek to obtain the required pass and the courage to descend to the river bottom, can witness a sight never to be forgotten. The mild weather thus far has been of great service in the progress of the work.

The Progress of Colorado.

The substantial progress of the mining industry in Colorado may be inferred from the following comparative statement of the product of gold and silver in the Territory for the last and present year. The figures may be relied upon as the most accurate that can be procured:

	1870.	1871.
Shipped by express	$2,160,000	$2,820,000
In private hands (est.)	120,000	140,000
Shipments in matte	884,000	923,000
" " ore	286,000	500,000
From Southern mines	100,000	130,000
" Northern	50,000	50,000
Used by manufacturers	75,000	100,000
	$3,675,000	$4,663,000

This is an increase of about 27 per cent. It may not satisfy the expectations of our sanguine Colorado friends. Certainly it does not fulfill all their prophecies; but to us it seems highly creditable and encouraging.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
WILLARD P. WARD, M. E.
Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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The Institute of Mining Engineers.

An important meeting of the Council of the Institute was held in this city on Monday, the 8th inst. The attendance was large, comprising four out of the six Vice-Presidents and five out of the nine Managers, besides the Secretary. Unfortunately, the President was not able to attend. The proceedings were unanimous in every respect, and gave new proof of the vigor which animates the Institute, and the earnest determination of all its officers, as well as members and associates, to labor for its success. The fact that so many gentlemen were willing to leave their private occupations and come to New York, most of them from a considerable distance, to attend a purely business meeting, is itself highly creditable to them and promising for the society which has entrusted its management to their hands.

The subject of the publication of proceedings and transactions was fully discussed. There are two policies, each of which has its advantages and its disadvantages. One is to publish the papers read before the Institute in periodical volumes exclusively, and distribute these to the members and associates. In this case, the members and associates are a select body, favored with information which is practically denied to the general public. The professional value of a connection with the Institute is thereby enhanced; but on the other hand the interest of its proceedings is likely to be diminished. Selectness is purchased at the risk of deadness—a statement, in illustration of which it would not be difficult to cite instances among eminent scientific and professional bodies. At all events, it was the conclusion of the Council that a young association like the Institute could not afford to withdraw itself from the publicity upon which for the present it must chiefly rely, to attract the attention and secure the coöperation of persons professionally or commercially interested, at home and abroad, in the mining and metallurgical industries.

The opposite policy is to publish a full report of the proceedings of each meeting and the papers presented, in some established journal, and send it to the members and associates. In this case, it will be seen, all the subscribers of the journal selected are equally favored with members and associates of the Institute; and the latter, if they are prevented from the social enjoyment of personal attendance upon the meetings, scarcely receive a full return for their annual subscription, unless the honor of a connection with the Institute, and the consciousness of assisting a worthy enterprise, may be considered an adequate recompense. On the other hand, the existence, nature, aims and advantages of the Institute are in this way advertised to the persons most likely to be interested; and experience has already shown that results, in increased public interest and voluntary applications for membership, are highly satisfactory.

This policy was provisionally adopted for the first three meetings, the proceedings of which were published in the ENGINEERING AND MINING JOURNAL. The third meeting in particular, was as fully and accurately reported as circumstances would permit. The only defects in the report arose from the circumstance that it was necessary to compress it into three numbers of the JOURNAL. This rendered it impossible to have the proofs read in all cases by the authors, and prevented the full publication, within the three numbers sent to members and associates, of some of the longest and most valuable papers.

All these and other elements of the problem being taken into consideration, the Council adopted, at least for trial until the annual meeting in May, a plan which we think combines the advantages and avoids the disadvantages of those heretofore suggested. A favorable arrangement has been made with the Scientific Publishing Company, by virtue of which the ENGINEERING AND MINING JOURNAL becomes the regular organ of the Institute, and will be sent to all the members and associates who have paid their dues for the current year. The dues are payable in advance at each May meeting, or in case of the newly elected, immediately after election, The present number of the ENGINEERING AND MINING JOURNAL will be sent to all who have been elected. After this week, it will be sent to those only who have paid their dues to the Secretary. For further particulars, see the official bulletin of the Institute in another column.

Official notices will be published in the bulletin aforesaid, and kept standing, at the discretion of the Secretary. We shall publish also, in a week or two, a full list of the officers and of the members and associates thus far elected. This will be the first publication including the additions made at the November meeting in Troy. The rules of the Institute will also be published in an early number, and afterwards sent to members and associates, in a circular.

Those members and associates who happen to be already the creditors of the Scientific Publishing Company for subscriptions paid in advance to the ENGINEERING AND MINING JOURNAL, will receive two copies of the paper, one on their private subscription and one on account of the Institute. We venture to suggest that the extra copies might be well bestowed upon friends, or might be convenient in case it should be desired to cut out and preserve in a scrap-book the professional papers which will sometimes happen to lie provokingly on both sides of the printed leaf; but we will not press these disinterested hints, since we are quite ready to refund to any person of this class the amount of his subscription from now till May next—that being the period for which the Institute promises to furnish him the paper. If he "comes to time" next May, and pays his dues to the Secretary, we will refund to him whatever may be due him on account of private subscription for the year following.

In addition to this publication of official notices, proceedings and transactions through the weekly organ of the Institute, it is intended to issue, after the annual meeting, a volume containing the papers of permanent interest presented during the year. The Institute cannot make absolute pledges as to the time of appearance or the size of this volume. No decisive official action has been taken concerning it; but the committee having the matter in charge do not doubt that it will be practicable to get it out in good style, and make it very valuable to the profession. It is highly desirable that it shall contain the reports of the committees on Coal Waste and Economy in the Production of Iron; and we trust that these committees, who are actively at work, will be able to report partially at the February meeting, and fully in May.

We continue in this number the publication of Mr. HAHN'S valuable paper on silver smelting, forming part of the paper presented at the Troy meeting, in the authorship of which Mr. EILERS was associated.

The February meeting of the Institute is to be held at Philadelphia, beginning on Tuesday, the 20th. Further announcements of the arrangements will be made hereafter in the official bulletin.

Montana Correspondence.

DEER LODGE, M. T., Dec. 15, 1871.

SIR—The great storm which visited the whole Western and Northern country—the like of which has never been known for severity and extent in the mountain regions (within the recollection of the oldest prospector, of course), has passed away, and the weather is again mild and warm, even approaching to that of May and June.

Affairs in this Territory remain nearly the same as they were last summer, with the exception of the late developments in quartz—both gold and silver—which have caused a better feeling to prevail. Property of all kinds has become firmer, and more especially is this noticeable in Helena, where the new and extensive Reduction Works have been erected. Had it not been for the storm they would have been running the first week in this month. However, a few days more and everything will be going ahead.

It is wonderful to see the change that has taken place. There are now eleven rich ledges being worked, and a great deal of ore is taken out in the Jefferson District, on Prickly Pear, some fifteen miles from Helena. Everything is bustle and excitement. Some of these mines have been lying idle since 1864–5, with the exception of work that has been done to hold them or to prove them to be genuine lodes. Thirty dollars per ton is being paid on the dump for ore from the Gregory, and the owner, Mr. MERRIMAN, could contract a thousand tons at those figures. I believe the amount of ore raised per day to the man is one and a half tons, with about a dozen men at work. Much of the ore for the works will be at present supplied from the Gregory, and veins in that vicinity.

If these works prove a success (of which all of us have the utmost confidence), a number of like establishments will be erected in different parts of the

Territory. Virginia City holds herself in readiness to follow suit—there being some very large, as well as extensive, rich veins within a few miles of that place. At Brown's Gulch, nine miles from there, much ore is being raised, some of it fabulously rich. Then, at Flint Creek, about which the excitecitement has long since died out, a great deal of work is being done in the way of getting out ores, preparing furnaces, &c., &c. Soap and Moose Creek Districts still retain their good names for valuable and lasting veins. The Argenta smelters still yield well. Vipond is doing magnificently; the veins are well defined, ranging in width from three to fifteen feet. I could enumerate half a score of districts where rich silver and galena veins have been found, and where, no doubt, smelting, or other works for extracting the mineral, will be in operation before long. There is one great satisfaction, anyhow, that we miners have; and that is, that if smelting and reduction works are not put up within reach of us, our quartz cannot run away; and in two or three years at least, we can ship to the States by the N. P. R. R., and have it reduced there. Those who have held their grip through many long years of toil and privation can surely hold it a little longer, especially as the dark has passed away, and the day already dawneth.

The gold quartz mining of the Territory is gradually taking a better turn; and a number of good, new mills are being erected at different points. There are probably no longer, better-defined, or more regularly-paying ledges worked anywhere than those at Keatingville, Radersburg, Minersville, Silver Star, Iron Rod, and some other localities that I could mention. A year or two more of time will bring them all into notice. The letters published last fall in the ENGINEERING AND MINING JOURNAL gave a correct idea of the future greatness of Montana, not only as regards mining, but also as a farming and grazing country, and a good country to live in as well.

I send you herewith a photograph of the monster ibex, or Rocky Mountain goat, captured on the high peaks at the head of Race Track. Also a bunch of his wool. Seven of these fellows were caught in all; but they were an unfortunate family. Two leaped off the rocks after they were lassoed, and killed themselves; two escaped from the coral at night, and can now be truthfully termed "scape-goats;" a male and female were taken to the ranche of Mr. PARMLEE (who caught them), ten miles below here, for the purpose of domesticating and raising numerous little goats; but they got into a domestic brawl (probably each blaming the other for their bad luck), which led to kicks and thrusts (their horns being very sharp), and they, too, gave up their goaty ghosts. There remained this fellow, of which you have the photograph—a mighty warrior, and named "the Patriarch." He was so vicious that he would charge on a camera at fifty feet and put the artist to flight. You see that he had to have guy-ropes to keep him from running away. A good negative was got of him, and then he was taken down to the ranche to be domesticated. You see that broken horn? He snapped that off in a $200 hound upon the mountains. The dog is on the mountains yet. But, to make a long story short, just as they got the "Patriarch" to the coral, he took a furious spell and bounded over the fence, and broke his neck or strangled himself. It was very unfortunate, for he was a curiosity. Preserve the picture, for you'll never see his likeness again. CAL.

A Classification of Steel.

THE great variety of methods employed of late years in the manufacture of steel and the want of a generally accepted nomenclature for the different products has created much confusion in the minds of many as to the qualities of steel. The exhaustive classification published about two years ago by Prof. Wedding of Berlin serves its purpose very well for Germany, but a translation is almost impossible and certainly impracticable for the English language, on account of the many new compound words which would have to be created.

Mr. THOS. M. DROWN has in a late number of *the Bulletin of the American Iron and Steel Association* furnished the following article.

The classification, which I desire to propose, has at least the merit of simplicity and conciseness. The main divisions only are provided with names. Suitable designations for the subdivisions were very much to be desired, but it is doubtful whether they would ever be generally adopted. I therefore content myself in pointing out clearly the natural divisions of the subject so that any variety of steel can at once be classified.

I. CRUDE STEEL.

1. From the Ore direct, by reduction and carburization. Ore Steel.

2. From Pig iron by decarburization. Pig Iron Steel.

(*a*) By means of gaseous oxidizing agents, (air, steam etc.). Ex. Bessemer Process, etc.

(*b*) By means of solid oxidizing agents, (ore, saltpetre, etc,). Ex. Puddling process, Heaton process, etc.

3. From wrought iron by carburization. Wrought Iron Steel.

(*a*) By fusion with Pig iron. Ex. Martin process.

(*b*) By fusion with coal or carbonaceous matter. Ex. Mushet's process, Indian process.

(*c*) By heating in charcoal—without fusion. Ex. Cementation process.

(*d*) By heating in atmosphere of carburetted hydrogen—without fusion. Ex. Macintosh process.

II. FINE STEEL.

1. By fagoting crude steel. Shear Steel.

2. By remelting crude steel. Cast Steel.

To go further into the details of manufacture would only serve to complicate the classification. The object in view is to present clearly the main feature of every process.

It will be evident, on a moment's reflection, that the raw material for steel making must be iron ore, pig iron or wrought iron. In the case of ore, the process consists mainly in reduction and carburization. This can be effected by gaseous carbon (carbonic oxide, carburetted hydrogen, &c.), or by direct mixture of the ore with coal. The resulting product may be required to be subsequently fused or otherwise treated, yet the main feature of the process is the reduction of the ore.

In the second subdivision where pig iron is used, the object is the removal of carbon, silicon, manganese, &c., which is effected by oxidation, the agents employed being either free gaseous oxygen, as in case of air, or oxygen in combined solid form, as in case of ore, saltpetre, &c. Here the iron may be molten as in the Bessemer and the puddling process, or simply at a red heat, as in the process for making malleable castings.

Where wrought iron is used the process becomes a carbonizing one. The carbon added may be in form of carburetted hydrogen, in form of charcoal or carbonaceous matter, or, pig iron may be used in proportion to its amount of carbon. As in the previous case, the conversion may take place both with and without fusion.

There are many processes which may be assigned to more than one of these divisione. Thus, the Bessemer process belongs mainly to the division I., 1, a., inasmuch as the decarburization of the pig iron is effected by a current of air. But as ordinarily practised the result of this operation is the production of wrought iron, which is subsequently converted into steel according to division I., 3., a., that is by the addition of pig iron. No classification could be made to take into acount all the details of a process without becoming cumbersome; it is sufficient for our purpose to indicate the most prominent feature of a process.

The fusion of wrought with pig iron is placed under the head of wrought iron steel, as in this case the wrought iron greatly preponderates.

There are, further, varieties of steel, which are named after substances which enter into their composition, as: Titanium steel, Chrome steel, Tungsten steel, &c. These can be arranged in the above classification by prefixing their characteristic names, as: Titanium pig iron steel.

Again, there are many steel processes in which an essential feature is the employment of substances to remove impurities as sulphur and phosphorus. These might be designated by affixing the name of the substances employed to the steel produced. Thus in the case of the Heaton process we would have pig iron steel by saltpetre, in the case of the Sherman process pig iron steel by iodine.

These terms, it must be confessed, are somewhat unwieldy, yet their descriptive nature may in some respects render them preferable to those in ordinary use.

The classification may also serve the purpose of showing at a glance the possibilities involved in the manufacture of steel.

Diamonds in the Ural.

In one of our German contemporaries, Prof. G. ROSE publishes an article on an hitherto unknown locality, where Diamonds occur.

After first briefly alluding to the finding of a diamond in Bohemia about two years ago, the celebrated *savant* communicates the finding of very small-sized diamonds, not as usual among the detritus of disintegrated rocks, but imbedded in xanthophyllite, a mineral occurring in the talcose schist of Achmatowsk, near Statoust, in the Southern Ural. The researches of Drs. Feremijero and Lissenko, at St. Petersburg, leave no doubt of the correctness of this important discovery, which is of great interest in reference to the origin and formation of diamonds, which, in the locality alluded to, as also in Brasil, occur in so-called metamorphic rocks. The author considers that diamonds may be remnants of organic material, the great mass of which has been destroyed by the metamorphosis the rocks, originally of so-called Neptunic origin, have undergone; but no reply can be given to the question, why in the itacolumite of Brasil the diamond should have been formed, and in that of Silesia (Strehlen) only graphite.

Steam Brake for Winding Engines.

The *Bulletin de d'Industrie Minerale* describes a new form of steam-brake for winding engines. The brake cylinder, instead of having, as usual, an upper cover, communicates by the whole of its area with a steam-chamber, of which the capacity is about three-fold the volume of the cylinder. This chamber connects with the valve-chest, the table of which has three openings; the lowest serves to admit the steam below the piston, the upper one opens the steam into the cylindrical chamber, and, of course, upon the upper face of the piston, and the intermediate one serves as the exhaust. The slide-valve has its upper side enlarged, and pierced with a rectangular opening corresponding to the highest opening of the table. The valve is worked by a man from a lever. When the brake is not in operation, the valve uncovers the highest and lowest openings, so that the steam acts equally on both sides of the piston. If the valve is moved, the lowest opening remains free, and the steam continues to act on the under side of the piston, but the upper opening closes gradually, and soon the steam contained in the upper chamber becomes confined. If the valve is again varied, the upper opening begins to communicate with the exhaust, and gradually the steam escapes. This movement is rendered progressive by the special form given to the upper opening. By reason of this slow escape the piston forced upward from below by the steam is moved slowly, and the brake is gradually put in action. If it is desired to hurry this movement the upper opening is uncovered, and the steam in the chamber passes out. If, however, the contrary effect is desired, after releasing from the chamber a part of the steam, the valve is lowered to cover the upper opening. The steam in the chamber is thus confined, with a portion of its initial pressure and limits the efforts produced on the piston rods. If this effort is too strong or too weak, the valve is raised or lowered, either to admit into the chamber more steam, or to allow more to escape. A gauge placed before the workman allows him to regulate the movements of the brake with the utmost nicety.

MINING SUMMARY.

California.

GRASS VALLEY DISTRICT.

From the Grass Valley *Union* of Dec. 19.

For the last few months, business in a mining way has been dull. This dullness has been owing mainly to the want of water, so far as the gravel mines are concerned, and partially to the want of water in the case of quartz mines. In the case of the latter mines, the failure of the Eureka, which had occupied the position of the leading gold mine of the world, to pay dividends, created a distrust of all quartz operations. Capital has been slow to assist labor in opening such mines, for capital argued that it might lose itself by venturing where there is nothing certain. If the leading mine falls suddenly from the position of a large dividend payer to that of a run on its reserved working fund, the smaller mines must be still more uncertain. Capital went off and tried to find safer things than mining. It failed however, in that, and insurance stock investments and real estate investments have been more disastrous to capital than have mining investments.

Grass Valley District has, during the dry months of dullness, been doing well; the rains which have come at last will make the mining business lively. We make a general review of the situation as it really is, in this district:

ERIE MINE

is located southwest from Grass Valley, on Dead Man's Flat, near the head waters of Squirrel creek. There are only two or three men working at this mine, and they are owners in the company. The idea seems to be that the Erie must work itself and build its own machinery, and the idea is not a bad one. The shaft on the Erie is down 55 feet on the incline. Three crushings have been made of rock while sinking. These were, the first of two loads; the second, seven loads; the third of fifteen loads. The first crushing $222, or $111 to the load; the second paid $1,015, or $145 to the load; the third paid $7,500 or $500 to the load. The total for the three crushings gives $8,737, or an average of nearly $365 to the load. The loads were something more than a ton each. The rock in the ledge is looking well.

GENERAL GRANT

is located south from Grass Valley some four or five miles from town and is convenient to Perrin's mill, on Wolf creek. The Grant is the furthest south of any mine which is now being worked in the district. The shaft is down between 140 and 150 feet. The ledge is improving in size as the miners go down, and it loses nothing in its appearance as it increases in size. The last crushing from the Grant gave $85 to the ton. The owners of the Grant mine are MARTIN FORD, JOHN TIERNEY and JOSEPH PERRIN. Drifts are being run on the ledge, while sinking is at the same time, continued.

JOHN BRIGHT

mine is southeast from town near the Colfax road. Work in the way of sinking has been prosecuted with energy, and the shaft is down more than 200 feet on the incline. The rock is looking very well.

BEN FRANKLIN

mine is near the Bright, and is being constantly worked. The shaft is down 60 or 70 feet and pay rock has been taken out.

GREENHORN

mine is located about 7 miles from Grass Valley. It is owned by an incorporated company which has its principal place of business at San Francisco. The Greenhorn is under the charge of JOHN TOWNSEND, the former foreman of the Empire mine, and one of the best miners of the district. The shaft is down about 262 feet on an incline, and is being constantly put down. Sinking will continue until water prevents that operation, and then drifts will be run on the ledge. In the bottom of the shaft the ledge is about 5 feet thick, showing free gold and heavy and rich sulphurets. On the dump pile there are about 500 tons of ore, which is waiting to be crushed. This will take place as soon as water can be had at the mill, and the present storm will furnish the water. The Greenhorn gives great promise of making a splendid mining property. It has paid well from the beginning.

MASSACHUSETTS HILL.

This hill, known far and near as being rich in gold-bearing quartz, is idle with the exception of work on the Shanghae ledge, which is supposed to be a spur of the main ledge of the hill. There is wanted for old Massachusetts Hill a consolidation of interests there. Not until such consolidation will productive work be done. The locations or claims of Massachusetts Hill are as follows: Scadden Flat claims, now idle; Stockbridge claims, to the south of Scadden Flat, also idle, and on which there is a shaft only about 16 feet deep; Massachusetts Hill Company's location, formerly celebrated, mill and underground works all idle; Rocky Bar claims, known to be rich; andPolkinghorne claims, idle. All these abovenamed claims of the hill, are square locations, and for that reason, principally, the hill is now idle. The "Discovery' claims of Massachusetts Hill are also square. This piece of ground was located about eight years ago, and it adjoins the Rocky Bar, Stockbridge and Boston Ravine claims. Work is now being done on the "Discovery" with a view to keeping the title good, under the customs and rules of the district. MATHER & COLLINS are the owners of the "Discovery" claims.

To show that Massachusetts Hill is regarded as very valuable mining ground we remark that not a company owning ground on that Hill will sell for less than $25,000, some of the companies ask $40,000 and upwards for their interests. It is said that consolidation of all the claims of the hill could be effected at an average of $25,000 for a set of claims.

BOSTON RAVINE

claims are on Massachusetts Hill, and this location is the only one there which claims the ledge with dips, spurs, angles, etc. This location was made eight years ago. The claims are 2000 feet in extent, commencing near the dump pile of the Rocky Bar, and running in a southernly direction toward Larimer's house. The owners are DAN. COLLINS, DAVID WATT & Co. We understand that $30,000 was offered for this property.

BLACK LEAD.

south of Massachusetts Hill, is regarded as valuable mining property. No work has been done upon it for several years. The owners of it are BEN MCCAULEY & Company.

PERRIN'S MINE

has good rock, estimated as being worth over $80 to the load, by mill process. The ledge is strong and well defined. Perrin's mine and mill are worked by water power, and water was somewhat scarce in the latter part of the Summer. They have power enough now to do all their work.

SOUTH STAR

has been worked, up to within a few days, with good prospects of developing a fine mine. The ledge is a large one.

NORTH STAR

is paying well and is being worked with a full complement of hands. The sulphurets from the rock are extremely rich.

COE

is being steadily worked. The shaft is down 350 feet, and a drift to the west is run 149. The rock in the bottom is looking exceedingly well, showing gold and heavy sulphurets. The ledge in the drift is of an average thickness of three and a half feet.

EUREKA MINE.

The prospects at the Eureka are most hopeful, and Old Ajax bids fair to become himself again. For the last twelve days, up to and including last Saturday, only twenty stamps of the mill have been running. The clean up for the time is gold valued at $22,000. In the lowest depths of the mine there is a steady improvement in the character of the rock and unless the best judges are deceived the good rock of the old days is coming back. The Eureka still lives.

DAISY HILL

is engaged in putting up machineryfor hoisting and pumping purposes and the work of development is going on at the same time. The Daisy Hill is a Great Valley company, incorporated and doing business at home. The mine is regarded here as one of the "coming mines." Since the present company has worked the Daisy Hill mine 175 loads of rock have been crushed. This rock gave $11,395 worth of gold. The last crushing of 42 loads paid $155 to the load. The rock in sight looks as well as ever.

NEW YORK HILL.

This mine has been leased by a party of working men. The mine is free of water and the miners are at work in it on the 4th level. We think the men will make it pay.

KNIGHT OF MALTA.

This location is north of Grass Valley, is east of the Idaho and Eureka mines and is in line with them. It is probably on the Eureka ledge. The owners are residents of Grass Valley. The ledge is fully three feet in thickness, heavily charged with sulphurets and shows well in free gold. Within a week past much fine specimen rock has been taken out. FRANK CARUANA & Co. are the owners, and the owners are doing their own work.

HOUSTON HILL

is being worked, with success, by parties who have a lease of the mine. The rock coming out shows well.

IDLE MINES.

There are many idle mines in the district other than those on Massachusetts Hill. Among these are the Norambagua, Allison Ranch, Harterey, Wisconsin and others down Wolf creek. The Union Hill mine, the Lucky and the East Eureka (O'CONNOR) to the east of the town are also idle. These mines have mills and machinery on them which time is slowly but surely wearing away. The East Eureka mill is a new one and is considered the finest in the State.

GRAVEL MINES.

The Hope, on Alta Hill, is the only mine in that locality now at work. Altona has shut down for the present, and will so until heavier machinery is put on. The Altona struck into the old works of Alta No. 1, and hence the rush of water. Town Talk, to the east of town, is running ahead with the usual good results. The Enterprise, near Buena Vista Hall, is having steam machinery put up for hoisting purposes. The Enterprise has rich gravel in the shaft. The Webster is in a fair way to resume work at an early day; work is now being done in washing over tailing and waste dirt. The Picayune is driving its tunnel ahead, and is in gravel which prospects well. The rains will make the Baltic commence work.

Colorado.

THE DENVER MINT.

The *Miner* of Dec. 14, in referring to the Report of the U. S. Mint & Branches, an abstract which we published ast week, says:

The *Miner* begs leave to differ from the expressed opinion of the Director of the Mint, JAMES POLLOCK, that the assay office in Denver, in the performance of its appropriate functions, fully meets all the demands of the mining interests of Colorado. We insist that the assay office in Denver, should be authorized to issue coin drafts for bullion deposited and that the Government should take upon itself the cost and risk of transporting the bullion manufactured in the Territory, to Philadelphia or New York.

The iron, coal and manufacturing interests of the nation have been fostered by judicious legislation, and why not encourage the mining industry of Colorado to the extent of releasing it from the cost and risk of transportation to Philadelphia or New York? It is not our individual opinion that prompts us to ask that the assay office in Denver be authorized to issue coin drafts It is the opinion of intelligent placer miners and mill men generally, that the issuing of coin drafts by our assay office would greatly encourage the mining industry of Colorado. The vampire of the rail is gorging itself on the blood and toil of the producers of silver and gold. After munificent land grants and appropriations in money for building railways, the Government permits an enormous tax to be levied on our mining industry that created the necessity of building continental railways. The republic of the world "has gone down into silence" in reference to the production of silver and gold, the true standard of refinement, intelligence and civilization. We have bureaus of education, agriculture, statistics, &c. &c., with magnificent land grants for the maintenance of the two former, all in accordance with justice and a due regard for the general welfare of the nation, and one commissioner of mines, with a meager salary for his maintenance, for the mining states and Territories west of the Rocky Mountains. We have no national school of mines located in the mining regions to educate the young men of America, who may wish to turn their attention to mining, engineering, and metallurgy. Theoretical knowledge in mining and the manipulation of ores to extract the precious metals, should be combined with practical experience and knowledge. Upon this question Rossiter W. Raymond, special U. S. Commissioner of mining statistics says:

"But while the principles of theoretical science remain everywhere the same, all questions of the best modes of applying those principles vary with circumstances. The economy of different methods and processes is so intimately connected with the price of labor and fuel that the process which is the best in one country is cast aside in another. It is a severe requisition that we make upon a young graduate of a foreign school of mines, when we ask him to adapt his acquired science at once to our widely different circumstance. Every such graduate has to reconstruct, alone and for himself, the whole art which he has learned—a work requiring genius as well as intelligent perseverance, and one in which many men fail, who, if they had been educated in the region where

they were to practice, would have been respectably and deservedly successful all their lives. A school of mines would speedily give us a settled and digested American science of mining and metallurgy, and the reproach that has been cast upon science would pass away."

In other lands, Governments have for centuries, by the enactment of wise and liberal laws, encouraged the production of silver and gold, but in the United States, where the highest degree of intelligence is supposed to prevail in the councils of the nation, the mining industry of the land is retarded by unwise legislation or the want of legislation altogether. The mining industry of Colorado (however much some persons may sneer at the idea) keeps alive and promotes all other industries. The total deposits of silver, $18,561.63 in the assay office at Denver, for the fiscal year 1871, does not equal the monthly production of one silver mill in Clear Creek county. There is no inducement for depositing silver bullion in Denver. It is sent directly to St. Louis or New York and sold to manufacturers of silver ware. The mill man turns his bullion over to the Banker, the Banker to the Express Company, the Express Company to the consignee in the city. All must be paid for labor and risk, and the total cost comes out of the hard earnings of the miner. Now why not authorize the assay office in Denver, to issue coin drafts? Why not enable the miner and mill-man to make quick sales and get quick returns for the product of their labors? As the mining industry of Colorado increases in importance (it is assuming greater proportion every month) other industries will increase in importance. All industries are therefore directly or indirectly interested in this movement. Our delegate in Congress, Jerome B. Chaffee, has done a good thing in introducing a bill in Congress, asking for an appropriation of money, to erect public buildings in Denver. Now let him do a better thing, a thing that will benefit the people of the whole Territory, secure the passage of a law, by Congress, to authorize the assay office in Denver, to issue coin drafts for bullion deposited in that institution.

The same issue of the *Miner* contains the following

BULLION REPORTS AND MINING ITEMS.

The mining news from all portions of the Territory is encouraging.

CAMPBELL & CLARK are shipping ore taken principally from the ground of the Clark Silver Mining Co., on the Terrible lode.

Gen. FRANK J. MARSHALL is shipping very rich smelting ore to Swansea, Wales. He has now a car load of Equator ore in preparation for shipment to the same place.

R. B. GRISWOLD of Idaho, takes charge of the Napoleon mine, Montana District. Mr. GRISWOLD is a good miner and will give general satisfaction to the owners of the mine.

Since our last issue, BAILEY & NOTT have shipped, on account of owners, only five tons of ore. The heavy state of the roads has prevented larger shipments. This firm have in store a large quantity of ore sacked and ready for shipment. They will ship seven car loads as soon as transportation can be obtained. The ore pile is increasing.

Rich placer mines have lately been struck on Grass Valley Bar, Idaho. A drift was run some time since and abandoned, because pay dirt was not reached. Lately, parties went to work in the abandoned drift and when they had drifted two feet farther struck rich pay dirt. The placer mines of Idaho are not worked out.

The Stewart Silver Reducing Co. have shipped

Brick No.	Oz. Silver.	Fine.	Coin Val.
390	1128	692	10 9.22
391	559	806	582.53
392	447	Gold and Silver	247.32
393	1135	Gold and Silver	481.23
394	1032	Gold and Silver	453.66
395	657	Gold and Silver	316.05
366	714	Gold and Silver	291.67
			$3381.68

Also Lead Bars,

87	519	320	214.71
88	888	256	293.92
			$3890.31

Palmer & Nichols have shipped since our last issue

Bar No.	Ozs. Silver.	Fine.	Coin Val.
224	1003.60	729	$ 964.81

Mining still continues to be attended with unprecedented success. The ore blockade has commenced to gripe many of our miners, and the indications are that the ore market will be so heavily glutted by spring, that our community will present the strange anomaly of being paralyzed with prosperity. Large quantities of ore for foreign shipment are accumulating both at the mines and in various ware-houses. The amalgamating ores are increased far beyond the capacity of our mills. The miners of Clear Creek county are justified by faith and by works also. We are satisfied that when spring comes, our ore blockade will be removed by increasing the capacity of our mills and the building of others. Transportation will then be more easily obtained, at greatly reduced rates. The present ore blockade will hasten the completion of the C. C. railway to Georgetown.

Idaho.

From the Owyhee *Avalanche* of Dec. 23.

MINING OUTLOOK.

The setting in of winter, in most mining districts, usually impedes mining operations to a certain extent, and produces a corresponding inactivity of business generally. But it is gratifying to know that a contrary state of facts exist in relation to our camp at the present time. At no time in the history of quartz mining has a section of country looked more prosperous, or has the future appeared brighter than now in Owyhee. The principal mills are all pounding away, and are well supplied with rich ores from the various mines. New discoveries are being made and old ones improved, and, without exaggeration, we can truthfully aver that a lively season is at hand, in which more sound, legitimate and paying business will be done than ever before in our history. The recent rise in the price of Golden Chariot, Mahogany, Ida Elmore and War Eagle stocks demonstrate the fact that the confidence of leading operators in mines has been well established by the actual merits of those valuable properties. Many of our most valuable mines are unincorporated, and consequently unknown in the mining market, but nevertheless they are being energetically worked by private individuals, and yielding hand-some profits. One of the present healthy features of our camp is, that there are but few idle men—and, indeed, no good industrious miner, who desires work, need now be idle a single day. Operations will most likely be resumed on the base metal mines of Cottonwood and Flint next season, and the opening of Spring will bring many thousands of dollars to South Mountain, to pay for properties that are bonded, and which will undoubtedly be sold. In short, our miners are hopeful, business men are encouraged, and the general prospect is of the most cheering character.

LOCAL MINING RECORD.

The North Discovery of the Oro Fino is still being worked by Superintendent WALBRIDGE, of the Owyhee Company, and is yielding a large amount of ore. It is reported that a very rich strike has just been made in that mine.

The South Oro Fino, bought some time ago by A. P. MINEAR of Phillips, and now being worked by the former, is yielding from 25 to 30 tons of ore per day, which is being crushed at the Elmore mill. This mine is now so well opened that about a ton of ore to the man is now being daily taken out, at a cost not to exceed $5 per ton. There are about 400 tons ahead of the mill, and no mine in Owyhee presents better facilties for extracting ore.

During the past week a rich strike has been made in the eleventh level of the Elmore, 130 feet north of the slip in the mine. Fifty or sixty dollar ore with a two-foot vein does not look much as if the mine had "petered out."

The Golden Chariot is now in tip-top working order, and is yielding fine looking ore from both the fifth and eighth levels. Additional hands have been put to work, and the Chariot will soon again wheel into the line of dividend paying mines, swell the purses, and make the hearts of stockholders glad.

The Minnesota mine is looking splendidly. The last contract for 100 feet of shaft is just completed which makes it 230 feet deep. And now, three drifts are let to run from the main shaft—one north and two south. As soon as these drifts are in far enough, stopping will commence. There are already out at the mine over 100 tons of ore that will yield at least $50 or $60 per ton, and will be milled about the last of this month. The Minnesota stock has been placed on the market and is quoted at $34.

The Mahogany shaft is still going down for the fifth level. About the first of next month the shaft will be down far enough to be out of the way of cutting the ledge at the fourth level, which we understand will then be done.

The South Chariot is now yielding fine ore from the fourth level lately struck by PETE NICK, who is running the drift. It is said to be $35 or $40 ore, with a large ledge. We understand that the ore from the drift will be crushed during the coming week.

The War Eagle mine, (formerly known as the Skookum) under the superintendency of W. D. WALBRIDGE, continues to yield a fine quality of ore. These shares were first put on the market at $4, and now command $7 About 400 tons of ore was milled last month, yielding $15,000.

We learn that A. P. MINEAR, has purchased from Messrs. MICKEY & TINKEY their interest in the Empire lease, which runs till the middle of June next.

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Lines of Property,

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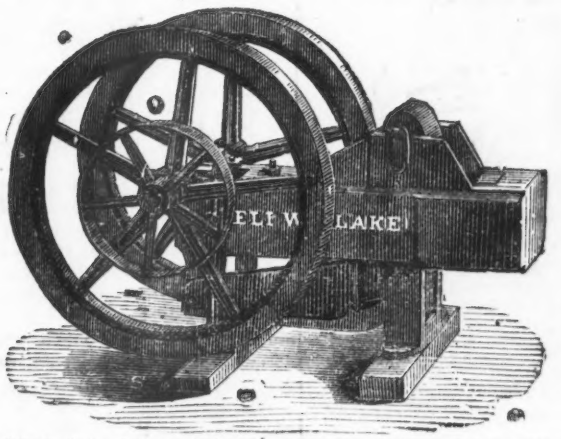

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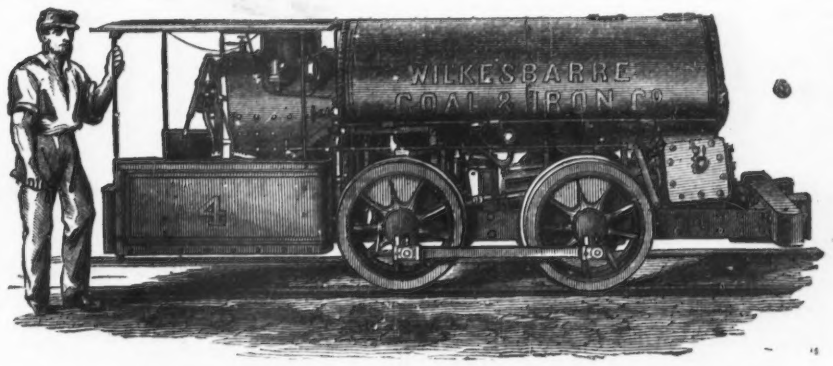

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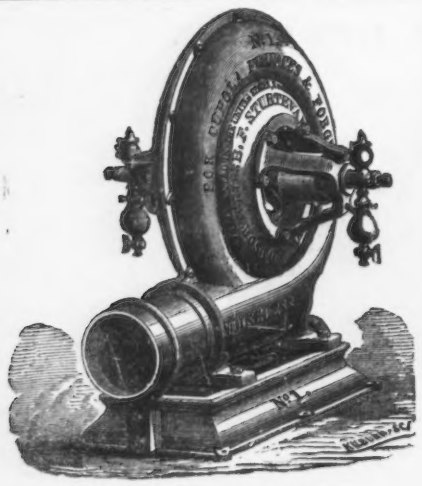

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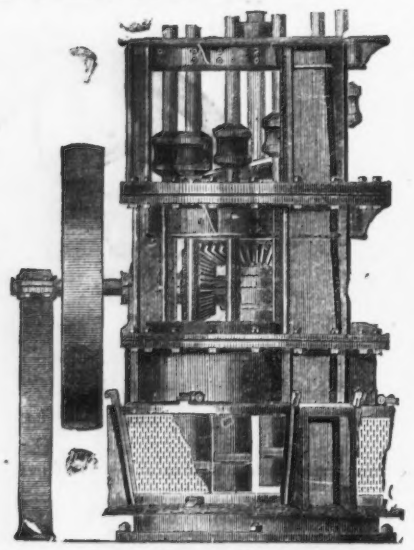

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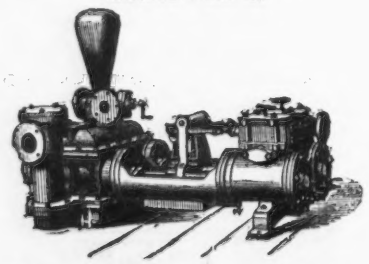

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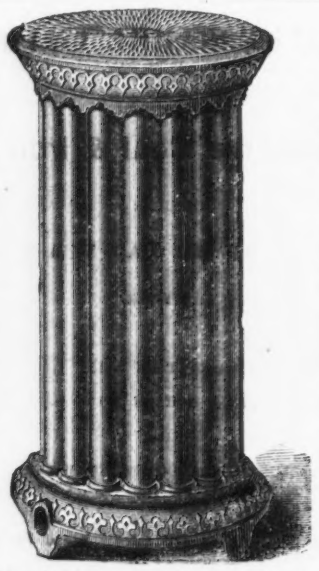

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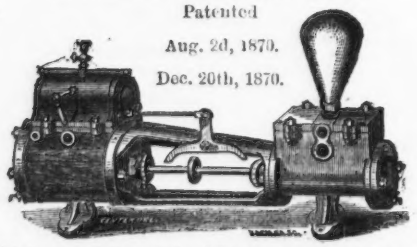

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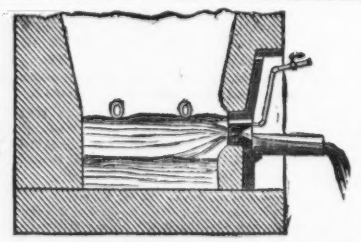

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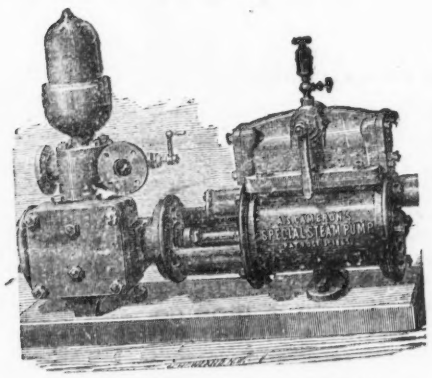

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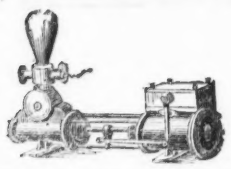

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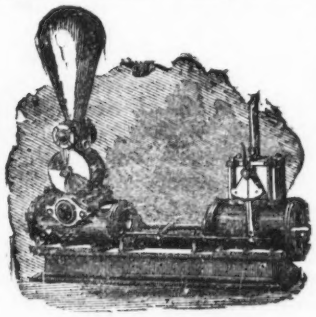

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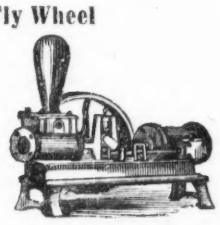

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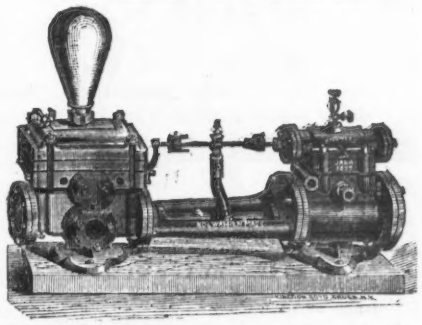

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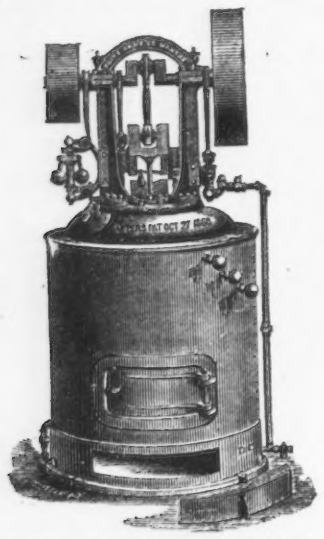

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